CONTEMPORARY ETHNOBOTANY AMONG THE APACHE OF THE CLARKDALE, ARIZONA, AREA COCONINO AND PRESCOTT NATIONAL FORESTS

by

MARSHA V. GALLAGHER

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FOREWORD AND ACKNOWLEDGEMENTS

The data contained in this publication were collected as part of a masters thesis project at Northern Arizona University, and gratitude must be expressed to those who made the final paper possible.

I am indebted to the members of my thesis committee, Drs. Norman Thomas, Charles Griffith, John Wood and Richard Hevly, who read and commented on the manuscript. Dr. Hevly also identified the majority of the plant specimens.

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Special thanks are due Professor Alfred Whiting for sharing his time and vast ethnobotanical knowledge. Without his painstaking work on the Goodwin ethnobotanical manuscript (now on file at the Museum of Northern Arizona), most of the data in that valuable source would have been inaccessible.

I am also grateful to the United States Forest Service. The permit they issued ensured that I could collect necessary voucher specimens on Forest lands. The staff at the Sedona Ranger Station was helpful and indicated to me areas of the Coconino and Prescott National Forests where particular species might be located. Finally, by publishing this manuscript, the Forest Service has ensured that the data contained in it can be more easily shared with the scholarly and lay communities.

However, the deepest gratitude is reserved for the many Indian friends who made the whole project both possible and pleasant, especially Mrs. Lulu Randall and Mrs. Daisy Russell, who taught me a little bit about plants and a great deal about friendship.

Marsha Gallagher
Museum of Northern Arizona
Flagstaff, Arizona
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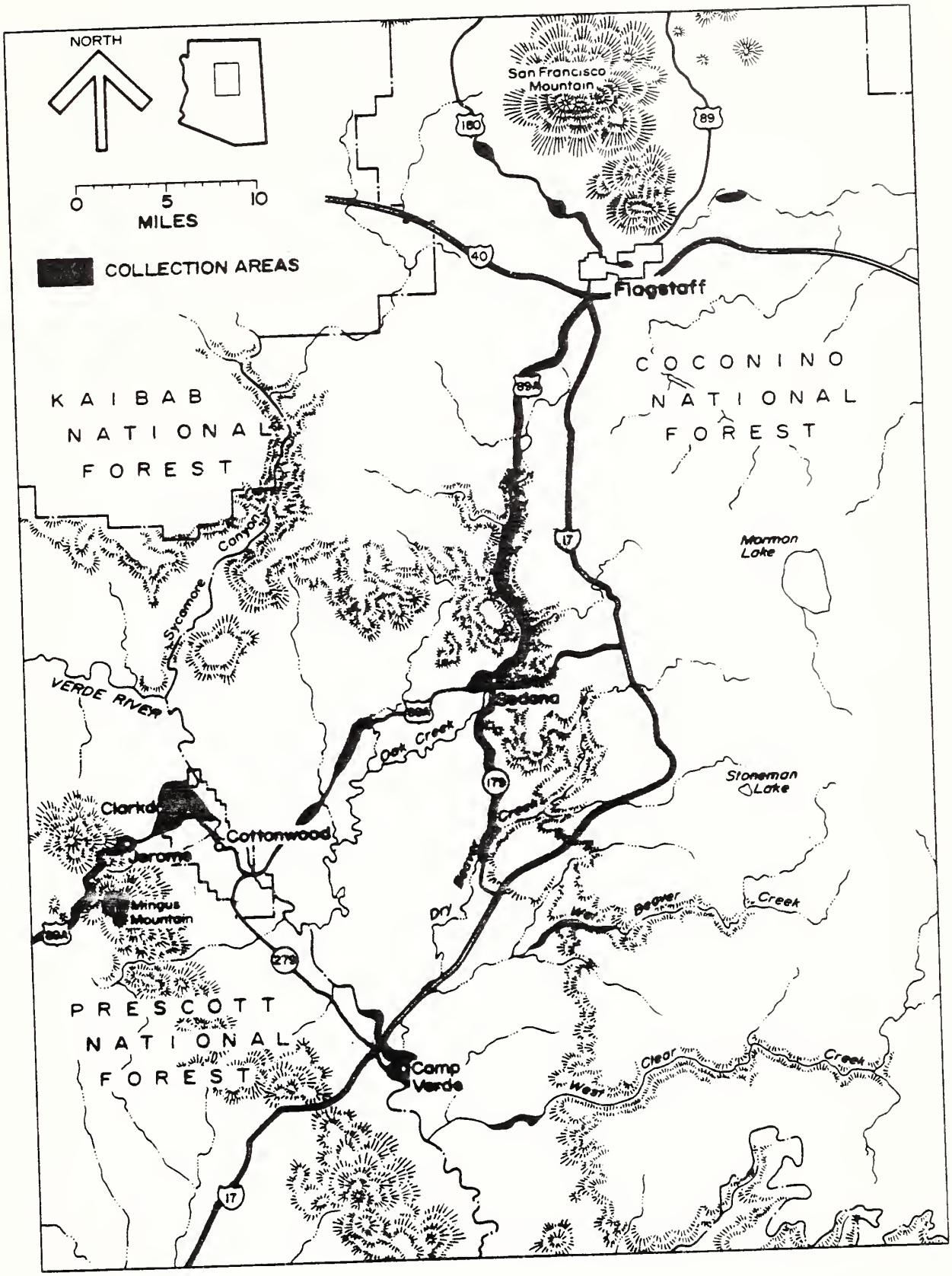

FIGURE 1. Central Arizona, showing National Forest boundaries, Clarkdale, and principal specimen collection areas.

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INTRODUCTION

The original intent of this research project was to record whatever knowledge of plant usage was still extant among the Apaches of the Clarkdale, Arizona, area. To date very little has been published on Western Apache ethnobotany. Also, it was felt that information of this nature might be disappearing in this modern world. In other words, the project, as originally designed, could best be described as straight "salvage" ethnography. However, as the field work progressed and it became apparent that a great deal of information was available, it seemed desirable to expand the research project to include two secondary themes or objectives. First, it was felt that the inclusion of some comparative materials along with the field data might yield a broad picture of Western Apache exploitation of environment and of how that exploitation compares with other groups in the Southwest. Second, if enough nutritional and pharmacological data could be obtained, it was hoped that some general statements could be made about the effectiveness of plant materials utilized in relation to their stated purpose.

Therefore, the final objective of this paper is threefold, with the first objective seen as primary or most important, and the other objectives as secondary:

1. To record the ethnobotanical information still extant among the Clarkdale Apache in the hopes that this will shed some light on Western Apache ethnobotany in general.

2. To make some statement about Western Apache exploitation of environment in comparison with other groups in the Southwest.

3. To make some statement about the nutritional and pharmacological adequacy of plants utilized for food and drugs in the past and present.

These objectives have been met with somewhat varying degrees of success, for reasons which shall be discussed in the conclusion.

Clarkdale was chosen as the field work area for several reasons, not the least of which was the fact that Apache friends living there expressed willingness to help with the project.

For readers unfamiliar with the area, Clarkdale is situated in central Arizona in the middle Verde Valley; Figure 1 pinpoints the location of Clarkdale and other nearby towns. The elevation of Clarkdale is approximately 3,000 feet, and the surrounding countryside is varied in terrain, elevation, and vegetation. A brief history of the general area and the Indian peoples living there seems in order at this point.

Based on the maps drawn by Gifford (1936: enclosed map) for the Northeastern Yavapai and by Goodwin (1942:4) for the Western Apache, the middle Verde Valley was probably occupied by both peoples in prereservation days. These maps overlap in this area. The Western Apache living here during this period were primarily Northern Tonto. Goodwin (1942:43-50) gives the best ethnographic description of the Northern Tonto bands and their cultural affiliations.

In 1871 a reservation was established at Camp Verde for a mixed group of Yavapai and Tonto Apaches. A brief account of the establishment of this reservation and of the events leading up to its

abolishment in 1875 is found scattered throughout Ogle (1940:1-245). The subsequent removal that same year of the some 1400 Indians from the Verde Reservation to the San Carlos Reservation is described by Corbusier (1968:259-80), whose father, an army surgeon, accompanied the Indians on the long, arduous trek.

The following information is taken from a recent article by C. P. Morris (1971:43-51), who has conducted ethnographic research of his own in this area. During the 1890's, Yavapai and Tonto Apache families began to move back to their former homes in the Verde Valley. There were arguments over Indian lands which had been homesteaded by whites during the Indians' absence, and in 1910 a forty-acre reservation was established at Camp Verde. In 1914 and 1916 an additional 448 acres were purchased to form the Middle Verde Reservation. In 1968, of over 500 tribal members, 155 lived on reservation lands, 140 lived in permanent settlements or in separate homes near the towns of Clarkdale and Jerome, and the remaining tribal members were scattered throughout Arizona and elsewhere. The settlements in Clarkdale were founded around 1910 when large numbers of the Yavapai and Apache in the Verde Valley moved to this area to seek employment opportunities arising out of the new copper mining and smelting operation there. Many of these people remained in Clarkdale even after the complete closure of the mines in the 1950's.

The most intensive field work for this paper was conducted over a nine-week period in June, July, and August of 1971, during which the investigator resided in Clarkdale. Information was also

collected during occasional trips to the area both preceding and following the period of intensive field work, so that information collection actually extended from January to November 1971. The techniques of data gathering included primarily informal interviews and participant observation.

Several Apache people gave the information on which this paper is based. Most live in Clarkdale, but a few make their homes at the Camp Verde or Middle Verde Reservations. Two women were the principal sources of information. Mrs. Lulu Randall is 65 years old. She is a Tonto Apache whose family has a long history in this area; her grandmother made the forced march to San Carlos in 1875. Her family returned to the Verde Valley in 1911 and settled some land just outside Clarkdale, which they still live on. One of Mrs. Randall's sons, Vincent, is currently chairman of the Yavapai-Apache tribal council. Mrs. Daisy Russell, who was 74 in September 1971, came from the Payson area. She is a Tonto Apache, as was her mother; her father was non-Indian. Mrs. Russell came to Clarkdale in 1914. Her husband was a Yavapai; and Mrs. Russell speaks that language as well as English and her native tongue, Apache. Many other people also gave information, but this usually only served to confirm that given by Mrs. Randall and Mrs. Russell.

There was a drought in this area prior to and during the time of field work. This was my own observation and a perusal of local meteorological records yielded nothing to contradict that observation. Needless to say, a drought has unfortunate consequences on ethnobotanical

work. For example, several times a plant and its use would be described and then the comment would be made that "This didn't come up this year. It's too dry." Therefore, some plants were identified from dried specimens or color photographs. Indications have been made in the text wherever this procedure seemed to cast any doubt as to a positive identification. For the most part, however, plants were identified in the field or from live specimens. Figure 1 indicates generally the principal areas visited. Voucher specimens were collected whenever possible, and these are currently filed at the Deaver Herbarium of Northern Arizona University. Occasionally, as in the case of cacti, a color photograph proved to be more convenient than a dried specimen. The photographs are also filed at the Deaver Herbarium. The botanical terminology used in this paper is taken from Kearney and Peebles' 1960 edition of Arizona Flora, as is the descriptive and distributive information.

The linguistic transcription system used to record Apache terminology for this paper has been borrowed from the Wycliffe Bible Translators. These people have published, often in mimeograph form, several Western Apache translations of Bible excerpts, some hymns, and an elementary Apache "reader." Most of these publications contain a key similar to the one reproduced below:

The Apache Alphabet

The vowel sounds in Apache are:

a as in father
e as in get
i as in machine
o as in go
u as in you

But they may be long:

aa	shitaa	my father
ee	bee	with it
ii	íí	dress
oo	dooléé	butterfly

Or they may be nasalized:

ą	ąął	it is finished
ę	a łts'ísę́	little
į	dį́į́'i	four
ǫ	dlǫ́'	bird

You notice that some of these vowels have tone marks (´) over them. That means that the syllables of which they are a part are said high. If the vowel is not marked, the syllable is said low.

yáá	sky	bini'	his nostril
yaa	louse	bini'	his land

nlį	he is
nlį́į́	you are

These consonants have about the same sounds as English:

n	neé/	nohwíí	we
d	dah		no
h	hanaa		across
g	gah		rabbit
b	bá		for him
y	yáá		sky
k	kįh		house
sh	shá		for me
s	sáan [sic]		woman
z	izee		medicine
l	dooléé		butterfly
t	tú		water
w	dawa		all
j	bijád		his leg
ch	chizh		firewood
m	mé'		baby

These consonants are not the same as English:

'	bi'imé'	her baby	ts'	tsaaɬ	cradle
ɬ	ɬį́į́	horse	dz	dzą́ą	here
ch'	ch'ah	hat	dl	dlǫ́'	bird
t'	at'éé	it is	gh	bighą	because

k'	k'adíí	now	hw	nohwá	for us
zh	zháálí	money	tł	diltłi'	burning
n^d	bin^{d}aa	his eye	tł'	tł'é'	night
ts	tséé	rock	kw	da'akwíí	how many?

(1958:2-3)

The Wycliffe system was chosen for two principal reasons. First, it was hoped that by selecting a system already in use among Apaches, at least some Apaches would be able to read or recognize the recorded terms. Second, preliminary tests of the system indicated that it was easy to use and also seemed to adequately cover the Apache sound system, at least for the purposes of this paper. For these reasons the Wycliffe system was followed as faithfully as possible. Even so, the following observations do not seem out of order. The /h/ is often strongly aspirated, becoming [x]. Occasionally free variation between /ts/ and /ch/ was observed. Finally, some Apache terms would seem to this writer to be better recorded as containing a glide rather than a vowel pair. For example, the Wycliffe recording of a term might be /tułbai/, and it is possible that a more desirable recording in this case would be /tułbay/. It is recognized, of course, that variations such as these could be due to dialect variations or to errors in transcription.

All transcriptions in this text should be regarded as tentative. The investigator had no prior knowledge of the Western Apache language and does not pretend to be an accomplished linguist. The Apache terms in the text are all local (i.e., Clarkdale) ones, unless specifically described as otherwise. Finally, the terms as recorded here do not

always agree with other sources, such as Goodwin ethnobotanical manuscript. Somtimes the disagreement in phonological, and sometimes lexical.

The main body of this paper consists of a data chapter followed by a final chapter containing concluding remarks. The arrangement of the data chapter requires some explanation. There are two common methods of presenting ethnobotanical data. One is to arrange the data in a standard taxonomic scheme; that is, to arrange the plants in groups according to their taxonomic orders, families and genera, and to discuss the preparation(s) and use(s) of each species as it appears in that group. The other method is to group the plants according to use and to discuss them individually or in groups under these categories. The second general method of organization was selected for these data since it was felt that this would allow for less repetition and also more interesting reading. The reader desiring to learn about a specific plant may do so by consulting the index.

The data chapter is divided into the following sections: Food, which is further subdivided into potherbs and salad, fleshy fruits, non-fleshy fruits and seeds, young shoots, beverages, miscellaneous, and agricultural projects; Medicine; Arts, Crafts and Domestic Items, which contains subsections on basketry, cradle board construction, dyeing, dwelling construction, and also on those plants used for firewood and soap; and Miscellaneous, which includes a listing of cultivated wild plants, plants named but not used, and plants recognized but not named.

The comparative material included in the data section is limited in several ways. First, the comparative data have been confined largely to the sections on food and medicine. It was felt that this admittedly time saving limitation would not greatly affect the adequacy of any general statements in the conclusion about exploitation of environment. Second, when other satisfactory comparative summaries for the Southwest were available they have been referred to rather than repeat the information. Finally, especially in regard to the greater Southwest, the search of the literature for comparative data was not an exhaustive one, but hopefully it was a representative sample including most major sources. For the Western Apache a special effort was made in regard to the collection of comparative data. Sources dealing specifically with Western Apache ethnobotany include Reagan's (1929:143-61) study of the White Mountain group, and an unpublished manuscript by Grenville Goodwin (n.d.:1-218). The "manuscript" is actually a typed copy of Goodwin's 1933 field notes. Goodwin died before the project could be completed. The data in the manuscript were apparently collected for the most part from White Mountain Apaches. A. F. Whiting is currently trying to organize and edit the incomplete data in the hopes that they may some day be published. At the present time, due to various problems inherent in the data, this does not seem likely. Several other Western Apache sources also provided some comparative material. These included various Goodwin publications on the Western Apache, Hrdlička's 1908 physiological study of southwestern Indians (which contains information about San Carlos

foods and medicines), Palmer's (1890:161-72) study of the Coyotero (probably White Mountain), etc. For the Eastern Apache, reliance was placed upon Castetter and Opler's 1936 ethnobiological study.

As a general rule, the local data for a plant are given first, followed by the local Apache term for the plant and the comparative data. The comparative data are single spaced in order to set them off from local data. Occasionally, however, when needed to clarify local usage, comparative data appear in the main text.

Nutritional or pharmacological information about a plant directly follows the comparative data and is also set off from the main text. Again, the search for this material cannot be considered an exhaustive one, but it includes all readily available sources. A nutritionist, Dr. Mary D. Vosburgh, and a pharmacist, Mr. Dennis Mitchell, helped in the interpretation of this information. The tables which formed the basis for most of the comments on nutritional values have been reproduced in Appendix II.

THE DATA

FOOD

The food plants may be conveniently divided into seven categories. These categories will be presented in the following order: potherbs and salads; fleshy fruits; nonfleshy fruits and seeds; young shoots; beverages; miscellaneous food plants; and agricultural products.

Potherbs and Salad

Five different kinds of "Indian spinach" were discussed during the course of the field work. Of these five only three are still regularly collected when available; one of these, /tajagis it'ą/, did not come up this year and so could not be identified.

The preparation is identical for all types of "Indian spinach." First the leaves are stripped from their stems--this is usually done at the time of collection. Then the leaves are taken home and boiled fresh in a large quantity of water. The length of time of boiling varies according to the tenderness and "bitterness" of the type of spinach. After boiling, the water is expressed from the cooked greens, which are then fried gently in a little grease and served. An alternate method of cooking was mentioned once: boil the greens, express the water and serve sprinkled with a little sugar. However, the first method is obviously the preferred one.

Those plants mentioned as potherbs include:

Amaranthus palmeri (careless weed): This coarse annual herb grows along rivers and is a common weed in corn fields. Reactions to this species as a food plant are somewhat mixed. Most of the Apache people with whom this plant was discussed were very fond of it. However, one family, who had a large quantity of it growing in their garden, did not share this enthusiasm. They considered it a pesky weed and were glad to have their friends collect it, thereby clearing their garden.

Apache name: /it'ą ditote/. The word /it'ą/ is translated variously as either "food" or "spinach." It appears in all but one of the names of plants used as greens, either fresh or cooked. It also appears in the names of certain "animal" foods, and therefore could probably best be glossed as meaning green, leafy and edible.

The Goodwin manuscript (n.d.:105) refers to the use of "young and tender" Amaranthus graecizans plants as potherbs. The greens were boiled and mixed with "green mescal." (Mescal is a common name for various species of Agave. Cooked mescal served as both a food and a sweetening agent in aboriginal times. For a more complete discussion, see p. 46.) Palmer (1890:170), speaking of the Apaches of the Fort Apache region, gives a little more detail on the preparation of native greens. The leaves were boiled and seasoned during the cooking process with dried mescal, which served as a sweetening agent or condiment. This technique sounds very similar to a Clarkdale method, mentioned above, of sprinkling sugar on cooked greens. Palmer also states that "the Apaches are very fond of greens" (1890:169), and that various species of Amaranthus and Chenopodium were most commonly used as such (1890:169-70). The Eastern Apache were still using several different plants as greens in the 1930's, including Amaranthus graecizans and A. retroflexus. The various spinaches were either eaten "without preparation" or boiled, "quite frequently. . .with meat" or animal bones (Castetter and Opler 1936:46-47). No mention is made of the use of mescal or sugar in cooking greens.

A brief review of the literature indicates that nearly every tribe in the Southwest employed one or more species of Amaranthus as potherbs. The most commonly mentioned preparation technique is boiling (e.g. Hicks 1963:150). Frequently these boiled greens are described as being occasionally or regularly fried in grease before serving (e.g. Robbins, Harrington, and Freire-Marreco 1916:53). The Northeastern and Western Yavapai sweetened their spinach with mescal (Gifford 1936:256;258) in much the same manner as the Western Apache.

According to the analysis given in Watt and Merrill (1963:6), amaranth greens are low in several nutrients, such as fat, protein, and carbohydrate, but are relatively high in vitamins A and C and in calcium. The calcium, however, is probably bound up with oxalic acid and therefore unavailable. Also, the Watt and Merrill analysis refers to raw greens. After boiling, presumably most of the vitamin A, a fat soluble vitamin, would remain, but at least half of the vitamin C, a water soluble vitamin, would be lost. It should be noted, though, that even the cooked amaranth would still provide about as much vitamin C as half a grapefruit. Finally, amaranth is a better source of iron than common spinach (Spinacia oleracea).

Aquilegia chrysantha (columbine): This plant with its beautiful yellow flowers is the most abundant and widespread species of the Arizona columbines. Although the plant was recognized by more than one person, only one friend could state a name and use for it. According to this woman columbine leaves were once used as a potherb. It is no longer collected.

Apache name: /tu it'ą/. "Water spinach."

Aquilegia chrysantha is described in the Goodwin manuscript as being "not good for anything except for kids to play with" (n.d.:106). As a matter of fact, only one reference could be located which stated an aboriginal use of any species of columbine for food. Hedrick, quoting Robert Brown's 1868 Gardener's Chronicle, asserts that the roots of A. canadensis were eaten by "some Indians" of North America (1919:59). The use of columbine for greens may have been an extremely localized or even idiocentric phenomenon.

Chenopodium sp. (goosefoot): This small leafy herb could not be identified to species due to the immaturity of the plant. Its Apache name and the fact of its edibility are apparently still common knowledge, but

only one person could actually identify the plant in the field. It may once have been an important or common article of diet but is not collected now, although it does grow in reasonable quantity in the area. I was told that: "We don't eat it any more. They ate it back when they were living on wild things."

Apache name: /it'a inkozee/. This name would translate loosely to "bitter spinach." Perhaps the taste of these particular greens was considered bitter and, when it was no longer necessary to rely on wild plants for sustenance, this particular potherb was rejected in favor of more palatable plants.

The sources consulted indicate that probably more than one species of Chenopodium served the Western Apache as greens. C. album is the most frequently mentioned species in these sources (e.g. Baldwin 1965: 60;61) and is the only species listed by Castetter and Opler (1936:46) as being used by the Eastern Apache. Buskirk (1949:342) says that "lambsquarter. . .seeds were [sown] broadcast around the camps" of the Cibecue and White Mountain Apache to ensure a plentiful and easy harvest.

C. album was utilized as a potherb by several other southwestern groups such as the Navajo (Elmore 1944:43-44). Other Chenopodium spp. were also so employed by various tribes; for example, the Zuni boiled young C. leptophyllum plants for greens (Stevenson 1915:66).

The analysis given by Watt and Merrill (1963:37) indicates that C. album is comparable to amaranth (discussed above) as a food. C. album is higher in vitamin A, equal in vitamin C, and lower in iron than is amaranth.

Cleome spp. (Rocky Mountain bee plant, yellow bee plant, spider flower): The leaves of two species of this genus, C. jonesii (yellow-flowered; by far the most common species in the area) and C. serrulata (purplish or pinkish flowered) were observed being collected for use as potherbs

during the course of the summer's field work. Both species are classed under the same Apache name. Another yellow flowered species, C. lutea, has been reported in the area and may also be being collected and classed under this name.

These plants were recognized as being edible by all persons consulted, but the leaves were actually collected by only one woman. The reason given for not collecting and eating this particular potherb was that it was always bitter tasting, no matter how long one boiled it. The woman who did collect the leaves dried a portion of them for use later in the winter when wild greens are not readily available. She was the only person observed to practice a method of preservation on a potherb.

The opinion was occasionally expressed to me that these greens might not have been a traditional item of Apache diet, or that they may have been utilized only by the Middle Verde Apaches, who in turn may have learned about the plants from the neighboring Yavapai. (The Yavapai name for these greens is quite different from the Apache term.) One woman commented that her grandfather, a White Mountain Apache, believed that this plant was harmful or poisonous, but that when she came to Middle Verde she observed that this belief was unfounded because "they all eat it here." However, the Goodwin manuscript does mention C. serrulata being used as a potherb, and the information was given by a White Mountain Apache woman (n.d.:70). The actual distribution of use of this genus among the Apache deserves a little more research.

Apache name: /ma agi/.

Aside from the reference in the Goodwin manuscript cited above, only Buskirk describes this plant as a Western Apache "spinach," and she seems to limit its use to the Carrizo and Cibecue bands and also to intimate that the food is a relatively recent introduction rather than an aboriginal item of diet (1949:343).

Within the greater Southwest the Navajo (Arizona State Museum 1951:25) and several Pueblo groups (e.g. Jones 1931:26) have been observed to use young C. serrulata plants as spinach. The Tewa (Robbins, Harrington and Freire-Marreco 1916:58-59), the Jemez (Cook 1930:26) and the Navajo (Vestal 1952:29) also made cakes out of these boiled greens. The cakes were dried and stored for future use; they were usually fried before eating.

Not available: This potherb is apparently well known and well liked and is collected whenever it is available. Unfortunately the plant did not come up this year, in all probability because of the severe drought in the area. It was described as being very similar in appearance to /it'ą inkozee/ so there is a possibility that there is another species of Chenopodium.

Apache name: /tajagis it'ą/.

Only one plant was mentioned as a source of salad greens:

Not available: This is, according to one friend, a plant that is usually fairly common in the area but which did not come up this year, again due to the drought. The young, tender leaves are eaten raw; older leaves are not suitable.

Apache name: /it'ą dil waase/.

Fleshy Fruits

Twelve different kinds of fleshy fruits, ranging from the large succulent fruit of the prickly pear to the thinly fleshed drupe of the

gray-thorn (Condalia lycioides) were described as sources of food for the Apache. Although most, if not all of these fruits may have once been important sources of food, only four are actively sought out and collected in quantity today. These four will be discussed first.

Carnegiea gigantea (saguaro): The bloom of this huge long-lived cactus has been designated as the state flower of Arizona. For those Indians who used the saguaro as a source of food the dependability of the crop must have been a rare blessing. According to Kearney and Peebles "the great capacity for water storage, combined with slow rate of growth, enables the plant to fruit annually, more or less irrespective of drought" (1960:569).

Trips to saguaro country are still made by at least a few Apache families when the fruit is ripe. However, my impression is that this fruit is not sought after as avidly or by as many people today as is the fruit of Rhus trilobata, for example.

The ripe fruits are collected by knocking them down to the ground with a long hooked pole called /chį' nezi/. The fruits are then gathered and taken home. In the old days those fruits not consumed immediately were split and dried for storage. Today, in this area, they are all eaten fresh and raw. One friend reported that she made a beverage from the fruits (see Beverages). The seeds were once saved and utilized as food (see Nonfleshy Fruits and Seeds).

Apache names: /nanoldzeege/.

Castetter and Bell (1937a:19), referring to a personal communication received from Grenville Goodwin, state that all five Western Apache groups utilized saguaro fruit as food, and virtually every source consulted for this paper confirms their statement. Just how important a food the fruit was seems somewhat in doubt. Hrdlička (1908:257), discussing the San Carlos Apache, called the saguaro "the most valuable of all the cactus fruits," while Goodwin in one place (1935:62) referred to the fruit as a Western Apache staple and in another publication (1942:156) described it as "not so important" as other wild crops. It seems reasonable to suggest that the extent of dependence on saguaro fruit may have varied according to its availability. If this speculation is correct, then one could deduce that the Northern Tonto bands, who would have had to travel relatively long distances to obtain saguaro fruit, may have depended on this food source to a lesser extent than, say, the San Carlos bands, who were located closer to the food source. On the other hand, the food may have been valued highly enough to motivate people to make long journeys to obtain it. Such gaps in our knowledge of native food habits make it difficult to assess the nutritional adequacy of aboriginal diets, a point which will be brought up again in the conclusion.

The most detailed account of the gathering and preparation of saguaro fruit by the Western Apache is found in the Goodwin manuscript (n.d.:54-56). The details given there do not vary significantly from the account given by the Clarkdale Apaches. As for the Eastern Apache, Castetter and Opler (1936:40) report that the Chiricahua formerly utilized saguaro fruit as a food but that the Mescalero never used this species as it did not grow within their present or past range.

It appears that saguaro fruit was gathered by almost every group in the Southwest that had access to it, and at least a few groups were heavily dependent on it as a food source. The harvest of these fruits was so important to the Pima, for example, that it marked the beginning of the new year in the Pima calendar (Russell 1908:71). Techniques of utilization (other than consuming the fresh fruit or juice) included drying the fruit; boiling the fresh or dried fruit to make a preserve or extract a syrup; and various methods of preparing the seeds, which were usually carefully separated from the fruit flesh and saved for future use. The Pima (Russell 1908:72) and Papago (Castetter and Underhill 1935:26) also made an intoxicating beverage from the fruit. The reader desiring more information on the widespread use and various preparations of saguaro fruit is referred to the Castetter and Bell monograph on the utilization of the tall cacti in the Southwest (1937a:1-48).

Ross' (1944:41) analysis of saguaro fruit (dry weight) showed a very high caloric value. The carbohydrate and fat contents were both high, indicating that the fruit is a good energy source. The protein content, expressed in a percentage, is about equal to that of ordinary white flour.

Opuntia spp. (prickly pear cactus): The genus Opuntia, which belongs to the family Cactaceae, has been characterized as presenting "many taxonomic difficulties" (Kearney and Peebles 1960:579). The folk taxonomist, in attempting to understand the Apache classification of cacti and succulents, is faced with comparable difficulties. Very little can be said here to clarify this area of Apache plant taxonomy, but a few statements can be tentatively offered on the basis of the present data.

The term /hosh/ appears to be both a classifying and a specific term. When the term is used in conjuction with a modifier, such as /hosh dijola/, /hosh/ seems to indicate a certain type or class of plants, probably a spine bearing plant (/hosh/ may be conveniently translated as spine or sticker). The term taken together with its modifier refers to a specific plant, i.e., /hosh dijola/ refers to Echinocereus engelmannii. This procedure seems somewhat reminiscent of scientific nomenclature with its genus and species. The implication is that /hosh/ designates a group of plants that might be called an Apache genus.

However, the term /hosh/, taken alone, refers to a much more narrowly defined group of plants: the prickly pears. It certainly includes those prickly pears with edible fruits. Opuntia macrorhiza and Opuntia phaeacantha have been identified in the field by this term. It may or may not include those prickly pears with dry fruits; there is no data available on which to judge. One thing is certain: the term /hosh/

taken alone refers to a group of plants probably not more narrow than those prickly pears with edible fruit, and not broader than the flat jointed Opuntia spp.; while the same term, when used with a modifier, appears to designate a much larger group of plants which includes Cirsium spp. as well as various species of cacti.

The term /hosh/ will appear several times in this manuscript in varying contexts. It is hoped that this brief discussion, although it unavoidably leaves many questions unanswered, will help to clarify the meaning of the term and its possible position in Apache taxonomy.

The succulent fruit of the prickly pear is still relished as a food and is probably still collected in at least small quantities whenever it is readily available. The plants in the immediate vicinity of Clarkdale bore no fruit this year; this was probably an effect of the drought and also an indication of its severity. At least one person mentioned the possibility of her family making a trip to some other area where the plants were heavy with fruit.

The fruits, which are often spiny, are knocked from the cactus to the ground with a piece of brush. Any kind of brush or leafy branch may be employed. The same brush is used to briefly scour the fruit to remove the large visible spines. The fruits are eaten raw, peeled and sliced.

Apache name: /hosh/.

All reports on the Western Apache, even the earliest (e.g. Smart

1867:417), observed that cactus fruits figured prominently in the native diet. According to many writers (e.g. Reagan 1929:146-47) a great variety of cactus fruits were employed. Goodwin, however, specifically refers to "the fruit of the prickly pear" as a staple food (1935:62). Gifford (1940:13) lists only the Northern and Southern Tonto as collecting cactus fruit other than the saguaro or prickly pear, and he comments (1940:95) that these other cacti were incidental, at least in the diet of the Southern Tonto. This observation agrees with my own impression that, among the Clarkdale Apache, prickly pear fruit has probably always been the most important cactus fruit, although there is the possibility that it may once have been overshadowed by the fruit of the saguaro. Gifford (1940:94) also points out that several different species of Opuntia were employed by the various Western Apache groups (eight different "kinds" by the White Mountain group); this again tallies with my own observations in the Clardale area.

Where descriptions are given of the gathering and preparation of prickly pear fruit they generally agree with the information obtained during this field work; that is, the fruit was brushed off to remove spines and then eaten raw. Buskirk (1949:319) adds that the seeds were consumed with the fruit. Three sources mention the preservation of the fruit by drying: Bourke (1891:131); Buskirk (1949:319), and Gifford (1940:13), both of whom record this technique for all Western Apache groups. Although in the Clarkdale area a very few wild foods are preserved today by drying, the prickly pear was not described as one of them.

The Eastern Apache formerly utilized the fruit of a number of species of Opuntia. The fruits were picked with tongs, brushed to remove spines, and taken home to be eaten fresh or to be dried and stored for the winter. Sun dried fruits were usually stewed in water before eating. The fruits of several other cacti were occasionally collected when ripe and eaten raw, but they were not so important a food as the prickly pear (Castetter and Opler 1936:41).

The prickly pear appears to be a source of food that was neglected by no Southwestern group. The ripe fruit was relished by farmers and nonfarmers alike and is undoubtedly still gathered in many places today (there is also a white market for preserves made of the fruit). Most commonly the fruit is described as being eaten raw (e.g. Russell 1908: 75), but several sources refer to various other methods of preparation such as sun drying (e.g. Castetter and Underhill 1935:23) or boiling (e.g. Gifford 1936:257).

The analysis given in Watt and Merrill (1963:107) indicates that raw prickly pears contain a fair amount of vitamin C. The calcium content listed in this table conflicts with that given by Ross (1944: 41). If the Ross figures are correct, one prickly pear supplies nearly the entire daily requirement of calcium. Several of the Indian foods

analyzed by Ross showed an unusually high calcium content. Apparently all of the samples were collected in Pima County, Arizona. There is the possibility that the soil in this area is calcium rich and that this factor affected the analyses.

Rhus trilobata (skunkbush, squawbush): This aromatic shrub is widely distributed throughout the Southwest.

The red berries, actually one-seeded drupes, can be and occasionally are eaten raw or dried. However, when the berries are gathered they are usually collected not for eating but for use in preparing a beverage known as "Apache lemonade" (see Beverages). R. trilobata has been mentioned in this section primarily to emphasize its prominence as a wild food in Apache diet today.

Apache name: /nk'oze/.

Palmer (1890:169) says that the Coyotero Apache washed, dried, and pounded the fruit of Rhus trilobata for food, and Hrdlička (1908: 259), referring to the fruit by its Apache name, describes the preparation of a thin mush from the berries at San Carlos. However, a close reading of the few Western Apache sources mentioning R. trilobata leads one to suspect that the more common preparation of the fruit was as a beverage (discussed in more detail under Beverages, p. 58).

Castetter and Opler (1936:46) state that the red fruits of R. trilobata were utilized "to a considerable degree" by the Eastern Apache. The sun dried berries were ground to a pulp which was mixed with water and sugar and cooked into jam.

Many southwestern tribes utilized this fruit for food. Some groups, such as the Uinta Utes, simply ate the berries plain (Chamberlin 1909: 36). The Isleta Indians used the somewhat acid fruits as an appetizer or relish (Jones 1931:41-42). Other peoples ate the berries not only "as is" but also ground (e.g. Robbins, Harrington and Freire-Marreco 1916:49). The Navajo also cooked the ground berries with cornmeal into a kind of gruel (Elmore 1944:61). Finally, several southwestern groups prepared a beverage from these fruits similar to the "Apache lemonade" discussed later in this paper.

Yucca spp. (broad-leaf yucca, banana yucca, datil): The large, pulpy, purplish or yellow fruit of the broad-leaf yucca somewhat resembles

a banana in shape, which is presumably the reason for one of its common English names. That the Apache also see a resemblance is evidenced by the fact that they apply the same name, /k'os k'an/, to the fruit of this wild plant and to the ordinary banana.

Although broad-leaf yucca is fairly plentiful in the immediate field work area and also in some nearby areas visited with Apache friends, not a single plant was observed to bear fruit this year. Therefore, it is difficult to estimate exactly how much of the fruit is collected when available. The impression gained from numerous conversations was that this fruit is collected in quantities comparable to that of the prickly pear--as much as is desired and/or can be eaten before the fresh fruit spoils. The fruit, or more specifically its pulp, is eaten raw. To be palatable raw the fruit must be dead ripe and soft to the touch. Proper picking time is September or October, whenever the fruit is ripe enough. If it is still green it may be boiled and eaten, but ripe raw fruit is preferred. One woman added that a long time ago people used to split and dry the fruit for winter consumption, but this is no longer done.

Apache name - plant: /iigaaye/; fruit: /k'os k'an/.

Nearly every Western Apache source consulted mentions the use of broad-leaf yucca fruit for food. Bourke's report on the Arizona Apaches states that the fruit was eaten raw when quite ripe or was baked in "hot cinders" if still a little green (Woodward 1943:40). The Goodwin manuscript (n.d.:48-49) lists both roasting and boiling as cooking techniques, but Reagan (1929:147) refers to boiling only as a method of preparing the

dried fruit. According to Gifford (1940:12;94), all Western Apache groups preserved the fruit by splitting it, scooping out the seeds, and sun drying it.

The Eastern Apache also utilized the fruit of the broad-leaf yucca, but their preparation and storage techniques were somewhat different. The fruits were collected while still green, covered with grass and allowed to finish ripening in the sun. The ripe fruits were roasted, then peeled, and the white pulp ground and formed into large cakes which were stored for future use (Castetter and Opler 1936:39).

Turning to the greater Southwest, Castetter and Bell (1938:3-74) published several years ago a monograph on the aboriginal utilization of yucca, sotol, and beargrass in this area. This monograph contains such a wealth of comparative information that it seems impractical to repeat it here. According to this monograph, all of the following groups collected this fruit for food or obtained it through trade: the pueblos of Taos, Picuris, San Juan, Nambé, San Ildefonso, Santa Clara, Jemez, San Felipe, Sandia, Isleta, Acoma, and Zuni; the Hopi; Papago; Pima; Yavapai; Havasupai; Walapai; Navajo; and Maricopa. Other groups known to have used this fruit for food include the Kiliwa (Meigs 1939:9), Cahuilla (Barrows 1900:59) and Luiseño (Hicks 1963:118). Of course, the extent of utilization varied from group to group, at least one factor influencing this being accessibility (Castetter and Bell 1938:21). It definitely was not a staple for all these peoples, as it was for the Western Apache (Goodwin 1935:62). Methods of preparation and preservation varied also, but the Apache techniques were not uncommon.

Two nutritional analyses of broad-leaf yucca fruit were located. An analysis of the fruit of Y. arizonica (dry weight) indicated that it might be a good energy food, since it was found to have a high caloric value and to be composed mainly of carbohydrates. However, this analysis, done by Ross (1944:41), may be including fiber in the carbohydrate percentage. If the fiber content is large, much of the carbohydrate would be indigestible. That this may be the case is indicated by Yanovsky and Kingsbury's (1938:652) analyses of Y. baccata, which give higher percentages of hemicellulose than of sugars. Also, crude fiber for one sample is listed as 49.7%. On this basis yucca fruit does not appear to be a particularly valuable food, but complete nutritional analyses are lacking.

The eight remaining fleshy fruits cannot be considered as important as those discussed above. They are recognized as edible, and most if not all of them were probably once collected in quantity; but they are no longer deliberately sought after and gathered.

Arctostaphylos pungens (manzanita, point leaf manzanita): This woody shrub is common in the chaparral areas of Arizona and elsewhere in the Southwest. The berries were typically eaten raw. One woman described a beverage that her mother made from the crushed fruits (see Beverages).

Apache name: /noosh/.

Three Western Apache sources mention some species of Arctostaphylos. The Goodwin manuscript (n.d.:139) contains a reference to A. pringlei as a food plant (the Goodwin voucher collection, currently stored at the Museum of Northern Arizona in Flagstaff, contains two specimens of A. pungens but no information as to use is given). Frazer (1885:15) and Buskirk (1949:341) state that "manzanita" berries were used for food. The dearth of references to this plant may indicate its relative unimportan as an aboriginal food.

Comparative information on manzanita berries is also sparse. The Navajo (Arizona State Museum 1951:35), Yavapai (Gifford 1932: 213;1936:256), and the Western Yuman groups (Hicks 1963:159) consumed the raw berries. The fruit does not seem to have been a staple anywhere, and Hicks, speaking of the Western Yuman area, specifically states that it was probably not an important food (1963:159). In addition to eating the raw berries, most of the above mentioned groups prepared a beverage from the crushed fruits.

Yanovsky and Kingsbury's (1938:662) analysis of the fruits of two species (A. tomentosa and A. uva-ursi) indicates a fair sugar content, but the analysis is really incomplete and does not contain sufficient data on which to base a valid statement about nutritional worth.

Berberis haematocarpa (barberry, holly-grape, red mahonia): The bright red berries of this evergreen shrub were eaten raw. One woman reported that a relative at San Carlos once made jam out of the fruit, but cooking does not appear to have been a traditional treatment for these berries.

Apache name: /dawali/.

For the Western Apache, only Baldwin (1965:62) refers to the use of B. haematocarpa berries for food. Castetter and Opler (1936:45-46) state that the Eastern Apaches frequently made jelly from these fruits. Castetter (1935:19) notes that some Pueblo Indians also make such a jelly but adds that this is a more common trait among Spanish Americans. The Jemez (Cook 1930:21) have been reported to gather and eat the raw berries of B. fenderli; the Yavapai (Gifford 1936:257) did the same with the fruits of B. fremontii.

The only nutritional analysis of a Berberis sp. (B. aquifolium) that could be located was that of Yanovsky and Kingsbury (1938:655) and their analysis is once again too incomplete to allow for any useful statement about nutritional value. The berries are probably relatively high in vitamin C, since most berries are.

Celtis reticulata (hackberry): Hackberry is a tree (sometimes a shrub) common along streams and washes throughout the State of Arizona from 2,500 to 6,000 feet. It is not an uncommon plant in other parts of the Southwest.

The berries, actually thinly fleshed drupes, were eaten raw. Apache name: /jiɬ hǽǽze/.

The Goodwin manuscript (n.d.:213) refers to the use of Celtis reticulata as a food plant; undoubtedly it was the berries which were eaten. The Eastern Apache ate the fruit fresh or ground it into cakes which were dried and stored for the winter. Occasionally they made jelly from it (Castetter and Opler 1936:46).

The Papago (Castetter and Underhill 1935:19) and several Pueblo peoples (Castetter 1935:21) collected hackberries for food. Grinding the berries was a method of preparation utilized by both the Navajo (Elmore 1944:41) and the Yavapai (Gifford 1932:212;1936:256).

A nutritional analysis of four samples of C. reticulata was carried out by Yanovsky and Kingsbury (1938:653). The most interesting result of this analysis was the finding that the berries had an unusually high calcium content.

Condalia lycioides (graythorn): This xerophytic shrub with its small leaves and very stout spines presents a somewhat forbidding appearance. It bears a blueblack globose drupe which is still occasionally eaten raw. The taste is said to be sweet, but there is not much to the fruit (due to the large stone).

Apache name: /chi gatdiɬjit/. The latter part of this term was translated as meaning something like rotten, but no explanation could be given for its appearance in the plant name. It certainly has nothing to do with the taste or edibility of the fruit.

Only one reference to the use of any species of Condalia as a food could be located. The Papago eat the fruit of C. spathulata raw. They do not consider it worth preserving (Castetter and Underhill 1935:19).

Echinocereus engelmannii (hedgehog cactus, strawberry cactus): There was some disagreement between the only two people consulted about the edibility of this small cactus' fruit. One friend had not eaten the fruit of this plant and did not think of it as an Apache food, although she had heard that other Indians ate the fruit. Another friend said that the fruits were good to eat, but that they should be cooked first. Apache name: /hosh dijola/. This may be loosely translated as "little round cactus."

The Goodwin manuscript (n.d.:117) describes a red fruit, undoubtedly a cactus fruit, which was gathered and eaten raw. The transcription of the name for this plant is very similar to the Clarkdale Apache term for E. engelmannii.

The fruit of several species of Echinocereus provided food for the Navajo (Elmore 1944:64; Vestal 1952:37), Isleta (Jones 1931:27-28), Acoma, Laguna (Castetter 1935:26), and the Western Yuman peoples (Hicks 1963:128). The fruits were prepared in several ways.

Juniperus sp. (cedar, juniper): The "cedars" present a situation in which, on the basis of present data, very few clear and certain statements can be made. There are several species of Juniperus in Arizona. The Apaches apparently recognize differences between species, although

they do not always differentiate the species by name (nor does common English). The berries of one and only one type of cedar (the Apaches' English term for this group of trees) were mentioned as being edible. Unfortunately this particular tree could not be located for positive identification as to species. However, from the description given, the species is probably J. monosperma. These berries are said to have once been an important food. The small, juicy fruits were eaten raw, the seeds being spat out. Quantities of the berries were also sun dried and stored for the winter. One method of preparing the dried fruits was to pound them and mix them with water. The mixture was then strained and the liquid drunk as a refreshing beverage.

Apache name: /tatle/ seems to refer to juniper berries in general. The term /gat izee/ is apparently limited to the cedar with the edible berry (probably J. monosperma). For a further discussion of the somewhat complicated terminology for cedars, see under Medicines, p. 89.

Almost every Western Apache source consulted mentions the use of juniper or cedar berries for food, the earliest report being found in Schoolcraft (1855:212). Goodwin (1942:157) states that juniper berries were an important wild food and that they were part of the regular collection cycle, being gathered in November. However, by the turn of the century Hrdlička observed that the San Carlos Apache "rarely" ate these berries (1908:258). There are a number of references to the species employed. Basso (1969: 11) states that the berries of J. osteosperma were eaten, while Baldwin (1965:63;66) refers to those of J. monosperma and "alligator juniper" (probably J. deppeana), and Palmer (1890:169) to the

"sweet" berries of J. tetragona and the "resinous" berries of another (unidentified) species. Reagan (1929:158) implies that the berries of three species, J. osteosperma, J. monosperma and J. occidentalis, were eaten. Gifford (1940:91) comments that "two kinds" of juniper berries were collected by the Northern and Southern Tonto but gives no further details. On the basis of this information it seems likely that the Western Apache as a whole were utilizing the fruits of more than one species of juniper, although the actual number of and the exact species may have varied from group to group or band to band. Information on Apache taxonomy is also needed here, since the "kinds" of junipers or cedars occasionally mentioned in the literature may refer to folk classifications rather than modern scientific ones.

According to Basso (1969:11) the Western Apache ate juniper berries fresh or sealed them in baskets for future use. Hrdlička (1908:259) and Palmer (1890:169) both cite boiling as a cooking technique, and Palmer adds that the whole fruit was sometimes pounded and formed into a kind of "bread." He was probably referring to the balls which were made of boiled, mashed juniper berries and stored for future use (described by Goodwin 1936:34). Buskirk (1949:335) states that a greenish, non intoxicating beverage was made by soaking juniper berries overnight and then pounding them together with broadleaf yucca fruit or dried mescal. This pounded mass was mixed with water, strained, and the resulting liquid drunk.

The Eastern Apache utilized the fruits of both J. monosperma and J. deppeana. The former were commonly roasted and mixed with water to form a thick sauce or gravy. The latter were eaten fresh or roasted, whole or ground (Castetter and Opler 1936:45).

A brief review of the literature gives the impression that virtually every tribe in the greater Southwest which had access to juniper berries collected and ate them at one time or another. The extent of dependence on this food seems somewhat debatable since many sources simply state that the berries were eaten; and, although preparation may be described, no estimate of quantity collected and consumed is given (e.g. Elmore 1944:19). Furthermore, at least a few groups used juniper berries only sparingly. The Walapai referred to them as "starvation food" (Kroeber 1935:54); the Hopi apparently eat them only as an accompaniment to piki bread (Whiting 1939:63); and Hicks suggests that they were not a highly esteemed food among any of the Western Yuman peoples (1963:144).

Species of Juniperus mentioned as providing food in the Southwest include J. deppeana, J. scopulorum, J. osteosperma, J occidentalis, J. californica and J. monosperma. Methods of preparation varied, but includes those listed above for the Clarkdale Apache and the Western Apache generally.

Harrington (1967:242), apparently referring to the fruit of J. scopulorum, states that the berries "have a high percentage

of sugar." However, Zigmond, commenting on Yanovsky and Kingsbury's analysis of the fruits of J. californica, J. occidentalis and J. osteosperma, has this to say: "The food value of the berries does not appear impressive, though the analysis is incomplete. No percentages are given for the fat, protein or ash content. Except in the case of J. occidentalis, the usable carbohydrates, if they represent the sole energy giving material, must be considered relatively unimportant. . . ."(1941:79).

Morus microphylla (mulberry): The tart fruits of this large shrub, which usually grows along streams at middle elevations in the state, were picked when ripe and eaten raw.

Apache name: /its'in/. The name is today translated as meaning "gun." There has probably been a transfer of meaning here since mulberry was once used in the manufacture of bows.

The Goodwin Manuscript (n.d.:134) contains a reference to the gathering of wild mulberries for food. The Eastern Apache (Castetter and Opler 1936:44) ate the fruits fresh or dried them in cakes for winter use, while the Papago (Castetter and Underhill 1935:19), Walapai (Kroeber 1935:54) and Yavapai (Gifford 1932:212;1936:257) simply gathered the fruit when ripe to be eaten raw.

Vitis arizonica (canyon grape, wild grape): The fruits were once, but are no longer, collected in large quantities to be eaten raw.

Apache name: /ta ch'aa/.

Frazer (1885:15) refers to the wild grape as a Western Apache food, and the Goodwin manuscript (n.d.:139) states that the grapes were picked "in thunder season" and consumed as is immediately. Of the sources consulted, only Buskirk mentions a preservation method. In addition to being eaten raw, "the berry was also pounded and dried. . .in the sun. . . . Another modern usage was to boil the juice from the berries to make wine" (1949:340).

The Eastern Apache (Castetter and Opler 1936:45-46) ate the fresh fruits and also dried them to be eaten like raisins at a later date.

According to Castetter (1935:53) Vitis arizonica was still an article of diet in the early 1930's at Isleta, Jemez, Acoma and Laguna. The Navajo (Elmore 1944:62), Walapai (Kroeber 1935:55) and Yavapai (Gifford 1932:212;1936:258) are also known to have collected the fruit. Apparently most, if not all, of these peoples simply ate the grapes fresh, without preparation.

Nonfleshy Fruits and Seeds

Eight different wild foods falling into this category were discussed. These edibles range from the fruit of the acacia which no one collects any longer, to the acorn which is probably the most sought after of the wild foods.

Acacia greggii (catclaw acacia, devil's claw): There are several plants classed under or given the Apache name /ch'il gojiza/, including A. greggii (the others are Acacia constricta, Caesalpinia gilliesii, Mimosa biuncifera and Robinia neomexicana; this list is probably incomplete). The explanation offered for classing these plants together was that "they all scratch you," which they certainly do; this reasoning is reflected in the meaning of the Apache name (see below).

Of all the plants bearing this name a use could be stated for only two, one of which was A. greggii. The pods or beans were once roasted and ground to a meal which was sifted to remove the seeds. This meal was then prepared and eaten in the same ways as that of mesquite (c.f. Prosopis juliflora). This has not been done in a long time. The preparation is considered to be too much trouble, for the beans must be roasted and the numerous hard seeds are a nuisance.

Apache name: /ch'il gojiza/. A loose translation of the name would be "bush that scratches you."

No reference to the use of Acacia greggii as a food by any Apache group could be located.

According to Kroeber (1935:33) A. greggii beans served as food for the Walapai. The Cahuilla (Barrows 1900:60) also occasionally used the beans for food. The Pima reportedly ate the beans in primitive times, but by the early twentieth century there was no one who knew how to prepare them (Russell 1908:76).

Amaranthus palmeri (careless weed): The seeds of this plant were once collected when ripe in much the same manner as sunflower seeds (see p. 33). The seeds were parched and then ground to a meal. A. palmeri seeds have not been gathered for food within the memory of anyone still living, although the knowledge of their edibility is still preserved. Apache name: /it'a ditote/.

Reagan (1929:155) states that the seeds of Amaranthus albus and A. blitoides were formerly eaten, and the Goodwin manuscript (n.d.:105) refers to the seeds of A. graecizans as being ground and boiled for food. According to Castetter and Opler, the Eastern Apache also utilized the seeds of Amaranthus spp. A. graecizans was mentioned as the most important species. The seeds were ground to make flour for bread (1936:48).

Amaranthus seeds were widely used throughout the Southwest. Common methods of preparation included boiling the ground seeds into a mush or gruel (e.g. Hicks 1963:150) or utilizing the meal as a flour (e.g. Stevenson 1915:65).

A government table on amino acid content of foods (reprinted in Turner 1959:159-76) indicates that amaranth seeds (species unidentified) contain 14.6% protein and provide at least some of the minimum daily requirements of essential amino acids. It should be remembered that, while they do supply needed protein, seeds in general have a biological value of about 65, in comparison to that of meat, which is approximately 75. Biological value refers to a food's ability to sustain growth.

Carnegiea gigantea (saguaro): The seeds of the saguaro fruit were once a part of Apache diet, although they are no longer utilized in this area as a food. To be prepared for eating the seeds had to be parched. In the old days a large flat basket was used in parching seeds. The seeds were placed in the basket with hot coals; the basket was then carefully

but vigorously shaken so that the coals and seeds rolled around together rapidly. Movement had to be fast lest the basket burn; it was not lined or protected in any way. This motion was continued until the seeds were seen to be properly parched or roasted and then the coals were dumped out. Parching today is somewhat different and makes use of more modern equipment; a skillet has replaced the basket, and a stovetop has replaced the coals as a source of heat. The motions remain much the same!

Parched saguaro seeds were ground with corn to make cakes. Apache name: /nanoldzeege biyige/. /nanoldzeege/ is the name for the saguaro; /biyige/ is one of the terms for seeds.

According to Gifford (1940:13) all Western Apache groups utilized the seeds of saguaro fruit as well as the pulp and juice. Apparently the seeds were always parched and ground before being eaten. Incidentally, Palmer (1890:169) says that the Coyotero parching basket was thoroughly moistened before use. Such a practice was emphatically denied by the Clarkdale Apache. Recipes for the ground seeds were varied. The San Carlos (Hrdlička 1908:257) mixed them with water to make a kind of mush, while the Cibecue (Gifford 1940:94) and the White Mountain (Buskirk 1949:318) ground them with corn, the latter to form a type of "pudding." It should also be noted here that, according to a Clarkdale Apache, there has recently begun at San Carlos a "revival" of interest in native foods, including saguaro seeds, which are dried, parched, and ground with corn.

Usually the groups in the Southwest who made use of saguaro fruit also ate the seeds. Drying, parching and grinding seem to be the general preparation techniques employed. As with the fruit, the reader wishing a more detailed account of the comparative use of saguaro seeds is referred to the comprehensive article by Castetter and Bell (1937a:1-48).

Ross' (1944:41) analysis of saguaro seeds indicates a fairly high protein content (higher than ordinary white flour) and also high fat and carbohydrate contents.

Hilianthus annus (sunflower): Sunflower seeds were once collected in large

quantities. The seeds could not be gathered until petals (or more technically the disk and ray flowers) had withered and dropped off. Then the women would take the dry flower heads and smack them sharply against their hands to discharge the seeds into their palms. These seeds were put into a large carrying basket worn on the back. The Apache name for this basket, referred to as a burden basket in English, is /ta ch'a'a/. The women would continue gathering the seeds in this manner until their baskets were full or the supply was exhausted.

The seeds had to be parched or roasted before they could be eaten (see above, Carnegiea gigantea, for a description of the parching technique). These parched, somewhat oily seeds were then eaten as is, with salt added, or were ground with corn or mixed with corn meal to make cakes.

Sunflower seeds are no longer collected. They are still enjoyed as a snack food but are purchased at a grocery store for that purpose. Apache name: /ya ai yineɬinii/. The word /ya ai/ means sun and is sometimes used alone to refer to this plant.

Almost every Western Apache source consulted mentions the use of sunflower seeds for food, and Goodwin (1935:62) refers to them as a staple. Various methods of collection have been reported. Buskirk (1949:328) says that a basketry seed beater was used to knock the seeds from the heads into a basket and that whole heads were occasionally collected, dried and the seeds shaken loose at a later date. Gifford (1940:95-96) reports the use of hardwood or stone knives by some Western Apache groups to sever the ripe heads. In order to prepare for eating, the seeds were apparently parched and then ground, often with corn. Buskirk says that the parched seeds were also ground with dried mescal (1949:329).

Goodwin (n.d.:137), speaking of the sunflower seed-corn meal, says that it was eaten dry or mixed with "something else," and Palmer (1890:169) described a porridge and thin baked cakes as being made from the plain sunflower seed meal. The more recent descriptions (e.g. Buskirk 1949:328-330) refer to the use of sunflower seeds in the past tense.

The Eastern Apache harvested sunflower seeds either by "threshing" or by knocking the ripe heads with a stick, causing them to discharge their seeds into a basket placed under the plant. The seeds were ground and the resulting flour made into thick "gravy" or baked cakes; the latter food was still "in common use" in the early 1930's (Castetter and Opler 1936:48).

According to Castetter (1935:30) "the Pueblo Indians of the Rio Grande valley seem to have formerly cultivated [Helianthus annus] for its edible seeds. . . ." Elmore (1944:87) reports the same for the Navajo, who ground the seeds with corn for cakes. The Hopi grow a large black seeded cultivated variety (sometimes identified as a variety of H. annus) and recognize the seeds of three local wild species as providing food for summer birds (Whiting 1939:96-97). As for the wild plant, the Yavapai are reported to have utilized sunflower seeds, with the Northeastern Yavapai gathering and preparation methods showing some similarity to those of the Western Apache (Gifford 1936:256). The Havasupai (Whiting 1940-41:103) prepared a peanut butter like spread from the seeds of Helianthus spp. Further to the north the Goisute (Chamberlin 1911:371) utilized the seeds of H. annus, and H. bolanderi is said to have been of major importance to the Owens Valley Paiute (Steward 1933:243).

The following statements about the nutritive value of sunflower seeds are based on the tables given in Watt and Merrill (1963:61) and Turner (1959:169). Sunflower seeds have a high caloric value. Sunflower seed meal, in particular, has a high protein content compared with other seeds. The meal contains a good deal of calcium and is also very high in niacin. The fat content would provide a good energy source, but it is difficult to estimate how much natural fat would be removed during the parching process.

Juglans major (walnut, Arizona walnut): The small, thick-shelled nuts of this tree are still collected. This was one of the few abundant crops in the area in this drought year. At least one family, and they were undoubtedly not the only ones, took advantage of this abundance by picking several pounds of the nuts as soon as they were ripe. Walnuts are gathered in the early fall; they are ready when they drop to the ground.

To eat, the nuts are simply cracked open and the rich tasting meats extracted and enjoyed. Walnuts were once used in other ways as food. Several people described the preparation of a "drink" which used to be made of walnuts and mescal (roasted Agave spp.; see under Young Shoots). First the walnuts were washed thoroughly to clean them and to remove the dry husks. Then they were placed in a mortar with strips of dried mescal, which was added for sweetening. This mixture was pounded thoroughly to crush and combine the ingredients. Next, water was added to the walnut mescal mixture, which was then stirred and strained to remove pieces of shell and mescal fiber. The resulting liquid could be drunk as a beverage but was more often poured over chunks of ash bread (a white flour bread made similar to a thick tortilla, browned on a grill quickly on both sides and then baked in the ashes of an open fire) and eaten as a meal. This was a delicious and filling dish but very rich and, as one friend warned, liable to make you fat!
Apache name: /ch'iɬ niyé/. The first term was translated as meaning "nuts," the second as "you pound it."

Most sources examined listed the walnut as a Western Apache food. Gifford (1940:14) made inquiry of only the White Mountain and Cibecue groups, but it seems likely that all groups utilized this food, as Buskirk (1949:333) implies. Hrdlička (1908:259) refers to the San Carlos as eating black walnut meats raw, and Reagan (1929:145;148) appears to be the only observer to record any form of cooking in the preparation of these nuts. The walnut-mescal beverage or gruel described by the Clarkdale Apache appears to have been a widespread and popular food, judging from the frequency with which it is mentioned (e.g. Buskirk 1949:333).

Among the Eastern Apache walnut meats were eaten raw, combined

with mesquite "gravy," or ground and mixed with mescal. In the early 1930's one Chiricahua band was observed to boil the meats before eating (Castetter and Opler 1936:42-43).

Castetter states that walnuts "are not extensively eaten" in the New Mexico area (1935:31). However, in Arizona, the Yavapai (Gifford 1932:209;1936:256), Walapai (Kroeber 1935:54) and Navajo (Elmore 1944: 39) have been recorded as gathering and using the nuts, the latter group "on a fairly large scale." The Yavapai (Gifford 1932:209;1936:256) prepared a walnut-mescal liquid in much the same manner as the Western Apache.

Black walnuts (Juglans nigra), when taken in relatively large amounts (50-100 grams), are a high calorie food (Watt and Merrill 1963:65). The protein content has been variously reported: Watt and Merrill (1963:65) give it as 20.5% while Turner (1959:168), quoting another government document, lists it as 15.0%. The latter source indicates that walnuts contain varying amounts of all the essential amino acids.

Pinus edulis (pinon): The pinon pine is widely distributed and abundant in northern and central Arizona between the elevations of 4,000 and 7,000 feet.

The seeds, commonly called pinon nuts in English, are still collected. The crop is variable; some years the nuts are plentiful, while in others production is meager to almost negligible. Trips to collect the nuts usually were and are made only when the crop is good. This year (1971) appears to be a sparse one and doubt was expressed by most friends as to whether a gathering trip would be worth the effort.

One can usually tell by August or September whether the crop will be good. The nuts are ready for collection in November. By this time the cones have fallen to the ground and have opened to discharge their nuts. The nuts are then gathered in large quantities and taken home; one friend said that she had gathered 50 pounds of nuts in one expedition to the Grand Canyon area in a good year not long ago.

To prepare for eating, the nuts are parched (see above, Carnegiea gigantea, for a description of the parching process), then shelled individually with the teeth, salted if desired, and eaten. This modern procedure varies somewhat from the older method, which called for lightly grinding the parched nuts on a metate and then sifting or winnowing them to remove the shells. Although the nuts are eaten plain today, there were once other recipes for them. They were ground with freshly parched corn to make cakes. Another technique was to grind the shelled, roasted nuts to an oily paste described as being just like peanut butter. This "pinon butter" was then spread on tortillas for a snack or a whole meal.

Apache name: /obe'/ refers to both the tree and the nut. The tree is sometimes called /obe' chin/. /chin/ means tree.

Pinons were gathered by all Western Apache groups (Gifford 1940: 13). They were an important food and part of the regular collection cycle (Goodwin 1942:157). Apparently two species, Pinus edulis and P. monophylla, were employed (Buskirk 1949:330). The following generalizations about the gathering and preparation of pinon nuts are based on the four most complete accounts available: Buskirk (1949:330-32); Gifford (1940:13;95); Goodwin (n.d.:17-18); and Reagan (1929:147).

If it were late in the season the nuts were gathered from the ground. More commonly it is reported that the cones were picked from the trees and then either dried or roasted in a fire so that they would open and the seeds could be dislodged. (This method was denied by one Clarkdale Apache of Northern Tonto origin.) Occasionally rodents' nests might be robbed of their large nut caches. It is not precisely clear in the literature but the impression gained is that the nuts were stored in bulk quantities after being freed from the cones and before any further preparation.

Harrington (1963:325), however, notes that the raw seeds become rancid after a time and adds that "the Indians" usually roasted

the nuts before storing. Some precautionary roasting would have been accomplished if the cones had been fired to dislodge the seeds. The nuts could be eaten raw or parched. A universal technique was to crack and remove the hulls individually with the teeth before eating. The Northern Tonto, Cibecue and White Mountain also hulled the nuts by cracking them on a metate and then winnowing. Hulled nuts were ground with corn to make a flour eaten by the pinch or cooked into mush. Hulled or unhulled nuts were also ground alone into a flour used for soup or baked cakes, or into a sort of butter.

The Eastern Apache (Castetter and Opler 1936:43) utilized the seeds of P. scopulorum and P. flexilis, but these were never an important article of diet. The seeds of P. edulis, however, were "very extensively gathered for food." The cones were gathered from the tree and the nuts dislodged. They were then either eaten raw or parched and shelled. The parched nuts could be mixed with yucca fruit pulp into a pudding, or ground and rolled into balls, which were considered a delicacy.

Pinon nuts were one of the most important and widely used native foods in the greater Southwest and are still collected by many groups. A brief comparative account of the gathering and preparation of the nuts, together with a partial list of the groups who employed them, is found in Castetter (1935:40-42), who calls the Navajo the "best and most extensive pinon pickers." Those groups known to have utilized pinons, but not mentioned by Castetter, include: the Hopi (Whiting 1939:63); Yavapai (Gifford 1932:208-09;1936:257); Walapai (Kroeber 1935:54); Havasupai (Whiting 1940-41:103); the Western Yuman peoples (Hicks 1963:146); and the Goisute (Chamberlin 1911:343). Nor was the use of this food limited to the Southwest. For example, Zigmond (1941:44) refers to pinons as the most important vegetal food of the Indians in the Great Basin. The most commonly mentioned gathering method was the collection of cones which were frequently roasted to aid in dislodging the seeds; although the gathering of already discharged seeds from the ground is also referred to, especially for the Navajo (e.g. Elmore 1944:22). Preparation techniques described were varied but included those of the Western Apache.

The most complete nutritional analysis of pinon nuts (Pinus cembroides var. edulis) is given in Watt and Merrill (1963:102). This analysis indicates that pinon nuts are a remarkably good source of certain nutrients. The nuts are very high in thiamine, much higher even than most cuts of pork, which is considered a good source. Thiamine is difficult to obtain in quantity in most foods. The riboflavin content is also high, higher than in pasteurized raw milk, again considered a good source. The niacin content of 100 grams of pinon nuts is about equal to that of 100 grams of cooked rump roast. Pinon nuts are a good staple from this point of view. Finally, the nuts also have a high caloric value and constitute a good energy food, primarily because of the fat content.

Prosopis juliflora (mesquite, honey mesquite): The mesquite, a shrub or small tree usually armed with sharp, straight spines, is common throughout Arizona at elevations of 5,000 feet or lower.

Mesquite beans were probably once an important item of Apache diet. Today they do not seem to be widely collected, although they are recognized as edible and are occasionally picked desultorily as a snack food when they are ripe.

However, at least one woman still collects and prepares the beans in the traditional manner for her family. This year the beans in the immediate area around Clarkdale suffered from the drought and did not ripen properly. But the beans around Sedona, some 20 miles northeast of Clarkdale, were quite good, and in early September my friend went and collected several pounds of them. The beans are said to be ripe when they have changed color from green to a speckled tan or yellow. Then they are plucked from the tree and brought home to be dried in the sun. They will keep this way for some time. The sweet beans may now be chewed as is, the seeds being spat out, or they may be prepared as follows:

Dig a hole in dry ground and line it with canvas. Put the dry beans in the hole and pound them with a stone (like using a mortar and pestle) till they are reduced to a fine granular meal. This meal can be mixed in a container with a large amount of water and then strained to remove the seeds; the result is a sweet tasting gruel or beverage. Or the meal can be sifted first to remove the seeds and then mixed with a

smaller amount of water to make a soft dough. The dough is formed into small cakes which may be eaten fresh or dried. When dried the cakes are said to keep up to a year and formerly made fine food for traveling. The Apache term for these cakes is /nestok/, which means powder like or pounded to a powder.

One other method of preparation, now apparently rarely if ever practiced, was described by several people. The fresh ripe beans were boiled and then eaten out of hand just like the sun dried ones. Boiling was said to intensify the sweet taste.

Apache name: /ii yáá/.

Virtually all of the Western Apache observers, even the earliest, refer to mesquite beans as an article of diet, and most describe them as an important or esteemed food (e.g. Smart 1867:417). However, Goodwin, although he lists mesquite beans as a staple (1935:62), expressed the opinion that they were not an extremely important food source and did not induce a concentrated harvest movement (1942:157). Accounts of gathering and preparation in the literature do not seem to vary significantly from the Clarkdale description, with one exception--the use of the seeds. Buskirk (1949:313), putting together a review of the literature with her own field notes, came to the conclusion that "when the fresh pods were pounded, the seeds were left in and pulverized with the pod [and] if the pods were dried before being used, the seeds were discarded." It should be noted, however, that Gifford's trait list (1940: 12) implies that the seeds were always thrown away, and this agrees with the impression received during the Clarkdale field work.

The Eastern Apache also made extensive use of mesquite beans. The beans were boiled and pounded into a thick consistency or ground into a flour. By the 1930's a meat grinder had replaced the metate for the latter method of preparation. The flour was made into bread and a sort of pancake (Castetter and Opler 1936:41). A mildly intoxicating beverage prepared from the ground, cooked and fermented pods and seeds is said to be a very old drink among the Eastern Apache (Castetter and Opler 1936:53).

The roll call of southwestern tribes utilizing the mesquite bean is a lengthy one. According to Castetter and Bell (1937b:21) "mesquite was

one of the most important wild plant staples of the Southwest . . . ." These same authors have painstakingly compiled such a mass of comparative information on the use of mesquite and of its relative importance to each group (1937b:1-55) that it would be pointless to attempt another such analysis here. Suffice to say that the pods and the seeds, taken either separately or together, figured prominently in the southwestern aboriginal diet. It is also of interest to note that, for those groups which ate the seeds or did not discard them soon after harvesting, the diet also included an insect (Bruchus sp.) present in almost every seed (Castetter and Bell 1937b:23).

Ross (1944:41) gives an analysis of Prosopis juliflora, but she gives no indication as to whether her sample was prepared from the pods or the pods and seeds together. She lists an average carbohydrate content of 73%. According to Cruse (1949:118), the pods are rich in sucrose. Sucrose would be readily digested, but other carbohydrates might not, due to the probable fiber content of the pods. Pant and Bishnoi (as abstracted in Chemical Abstracts 67:89875t, 1967) found a relatively high crude protein content for the seeds. It should also be noted that ingestion of the insect matter described above would provide some vitamin B-12, an important nutrient rarely present in vegetable foods.

Quercus palmeri (Palmer oak): There are several species of oak in Arizona, but the Clarkdale Apaches collect acorns from only one tree, which was observed to be Q. palmeri. Other acorn bearing trees or shrubs, specifically Q. gambelii and Q. turbinella, are present in the area in relatively large numbers, but their acorns are avoided on the grounds that they have "no taste," and that /chi chil/ (Q. palmeri) had always been the source of acorns for the Apache.

The acorn was and is one of the most popular and widely sought after of the wild foods. Almost everyone consulted knew the plant and the foods made from its fruit. Most enjoyed the taste and either had participated or were willing to participate in its collection. However, it may be that actual knowledge of and experience in the preparation of acorns is limited to the older generations.

Several attempts were made to collect acorns this year (1971), some of them involving long distances and overnight trips. All were failures, and no acorns were to be found at any of the familiar gathering places. In some cases the drought was seen as responsible, for there were either no acorns on the trees or acorns so stunted and dry as to be useless. In one case a potentially good crop was destroyed while still green, probably by hail. This was a source of great disappointment, because this was the second year in a row that there were no acorns.

When they are available acorns are collected after they ripen, usually in the late summer. They are ready when they are a reddish brown in color; green acorns are no good. The acorns are gathered from the ground. If they are ready but have not yet fallen, they are knocked down with a stick.

At home the acorns are lightly pounded or ground on a stone to crack and loosen the shells which are then sifted or winnowed out. The meats are ground to a fine meal on a metate. This meal is stored in a jar or other covered container until needed. It serves as a thickening and flavoring agent in making "acorn soup." First a generous portion of meat is stewed in the ordinary way. Sometimes a little green corn is added for variety. When the stew is almost finished a cupful or so of the acorn meal is mixed with water to form a paste which is gradually stirred into the simmering stew. After a little more cooking the

acorn soup is ready to serve. It is said to be particularly good scooped up or served with tortillas.

The acorn meal and water paste can also be stirred into simmering pumpkin, squash, or beans for a satisfying main dish.

Apache name: /chi chil/.

Goodwin (1935:62) rates mescal and acorns as the most important Western Apache staples, and Gifford (1940:92) says that the Northern Tonto called acorns their most important wild crop, implying that acorns outranked even mescal in the aboriginal diet. There are conflicting reports on the exact species utilized. Gifford (1940:92) lists four oaks in order of preference for the Southern Tonto (Quercus gambelii, Q. emoryi, "scrub oak," and "another," the last two being about equally third choice). The San Carlos preferred the acorns of a scrub oak, Q. arizonicus, and avoided those of "the blue oak" (Q. sp.) (Hrdlička 1908:259; Gifford 1940:92). Reagan (1929:148) lists only Q. undulata for the White Mountain, and Goodwin (1942:157), speaking of the Western Apache as a whole, makes reference to only Q. emoryi. There is always the chance that botanical misidentification has caused some of this confusion, since a few of the species mentioned closely resemble one another (e.g. Q. palmeri and Q. emoryi). Moreover, little attention has been paid to native taxonomy. The Apache may well class two or more kinds of oak together (for example, the term Reagan obtained for Q. undulata is almost identical to that given by the Clarkdale Apache for Q. palmeri) so that when an Apache speaker says that "one kind" of acorn is eaten, he may in fact be referring to a class which includes several recognizable botanical species and varieties. The only safe conclusion to be drawn from all the evidence available is that it is probable that the Western Apache utilized more than one kind of sweet acorn, and that preference for one or another species may have varied from group to group.

Acorns were collected and shelled in the same manner described by the Clarkdale Apache. However, they were usually stored whole, shelled or unshelled, rather than ground, as the Clarkdale Apache do today (Buskirk 1949:309-10; Gifford 1940:92-93). Whole acorns were eaten raw (Buskirk 1949:310); the Southern Tonto ate them boiled like beans (Gifford 1940:11). Raw acorn meal was used in a variety of ways: mixed with flour and made into bread (Reagan 1929:148); eaten plain, either dry or moistened; sprinkled on other foods; and mixed with ground cooked meat (Buskirk 1949:311). Acorn soup or stew is continually mentioned in the literature and must rank as one of the most popular of Western Apache dishes. The Goodwin manuscript (n.d.:138) contains a recipe

almost identical to that given by the Clarkdale Apache. Finally, it should be noted that in the 1930's Goodwin (1935:64) referred to the acorn as "still a staple," and Buskirk noted that in the 1940's (1949: 308) it was the only wild food for which large gathering excursions were still made. Personal experience indicates that this is probably still generally true today (1971).

The Eastern Apache utilized the acorns of Q. grisea and Q. gambelii, although the latter were considered not so sweet as the former and were not as extensively used. Acorns were eaten raw or roasted, pounded, and mixed with dried meat or fat. This mixture was stored in hide containers for future use (Castetter and Opler 1936:42).

The acorns of Q. utahensis and Q. gambelii were formerly an important food among the Pueblo Indians of New Mexico and were still being boiled or ground to meal in the 1930's at San Felipe, Acoma and Laguna (Castetter 1935:47). Elsewhere in the Southwest, acorns were used by the Papago (Castetter and Underhill 1935:19), Pima (Russell 1908:78), Goisute (Chamberlin 1911:343), Walapai (Kroeber 1935:54), Havasupai (Whiting 1940-41:108), Yavapai (Gifford 1932:207-08;1936:257), and Navajo (Vestal 1952:22). Acorns do not appear to have been of major importance, at least within recorded history, to any of these peoples, with the possible exception of the Northeastern Yavapai. Methods of preparation were similar to those of the Western Apache. A cursory review of the species employed by the above groups indicates that all were sweet acorn bearing. The Western Yuman peoples, among whom the acorn was an esteemed food, apparently preferred species bearing bitter acorns, which had to be leached (Hicks 1963:129-38).

On the basis of available information little can be said about the nutritive value of acorns, particularly those of Arizona species. The protein content of acorns (species unidentified) is given in Turner (1959:169) as 10.4%. However, according to a nutritionist, this probably has a low biological value (Vosburgh 1971:personal communication). Mohaček (as abstracted in Chemical Abstracts 54:14497b, 1960) did an analysis of the acorns of three species of oak grown in Yugoslavia. He found that the nutritive value of these acorns depended primarily on the high nitrogen free extract (the nonprotein portion). The starch value of these acorns when fresh was 48-52%, which was interpreted as meaning that 100 kilograms of 50% value can substitute for up to 61 kilograms of corn of average quality ("corn" may have been used here in the European sense, i.e., as meaning wheat).

Not available: One woman told me that long ago the seeds of a medium sized (3'-4') desert shrub were used as food. They were prepared in the same manner as sunflower seeds (Helianthus annus; see above).

Apache name: /najíí/. This is also one of the Apache terms for seeds and apparently refers to those small in size.

Young Shoots

Only two food plants falling in this category were discussed, but one of them, Agave spp., was once one of the most important items in the Apache collection cycle.

Agave spp. (century plant, mescal): There are several species of this succulent scattered throughout Arizona and the Southwest. Unfortunately, due to limited means of transportation during the concentrated field work period and the fact that there are today no species of Agave in the immediate Clarkdale area, the exact species utilized by the Apaches could not be determined. However, there are a number of statements which can be made with some confidence.

It is probable, but not yet certain, that the Apache term /nada/ is limited to species of the genus Agave. Technically the term /nada/ applies to the basal rosette, while the term /bikaz/ refers to the stalk or inflorescence (/bikaz/ also appears to be a generic term for stalk or stalk-like plant parts). In practice the whole plant is usually called /nada/. When speaking English the Apache refer to both the plant and the food it yields as mescal.

Several different types of /nada/ are recognized and distinguished by name. These may or may not correspond with single

species of Agave. /nada ntliz/ is a "little one"; the latter term refers to its characteristic size. This variety is said to grow in quantity on the Walapai reservation. If this is true, then /nada ntliz/ is probably A. utahensis, which is limited in its Arizona distribution to the northern part of the state, primarily the northwest corner (Castetter, Bell and Grover 1938:14), and which has been reported as the principal or only species of Agave utilized for food by the Walapai (Kroeber 1935:32). /nada ch'ié/ is another recognized variety. /ch'ié/ is one of many Apache words meaning small in size; one woman said that she had seen a /nada/ of this kind measuring only three or four inches in diameter. /nada ɬbayi/ is the only other variety of /nada/ that was discussed. /ɬbayi/ means greyish in color and the plant was described as being "big and grey." /nada ɬbayi/ was subsequently pointed out to me on a trip to Mingus Mountain top where it was growing in relative abundance. My friends added that this was the only kind of /nada/ that grows there. This plant has been identified as A. parryi on the basis of elevation and distribution. There was some disagreement over the edibility of this /nada/. One woman said that only the stalk of /nada ɬbayi/ was eaten. The other woman said that the base was also eaten and that her grandmother had once broken her digging stick in trying to pry up a particularly large specimen.

/nada/ has not been collected and prepared in this particular area for a long time. Everyone consulted agreed that not many Apaches anywhere

made mescal any more. The work involved in its preparation is one factor. Another reason offered was that people "weren't allowed" to gather the plants as they used to; this probably refers to Forest regulations, and to State laws which protect several families of plants, including that to which Agave spp. belongs. However, /nada/ has been collected within memory. For example, one woman said that her mother used to cook her mescal in a pit near Payson. Another said that her aunt had owned a mescal pit in the Fossil Creek area where her family traditionally collected /nada/. Both of these women have participated in the gathering and processing of the plants.

Collection and preparation was the same for all types of /nada/. The plants could be gathered only at a certain stage of growth; that is, only when the inflorescence or flower stalk had just begun to appear. This would occur only once in the plant's lifetime, for although an Agave sp. may live many years it only produces one massive flowering stem before it dies. According to the Apaches, a plant gathered before it bloomed would be woody and tasteless or unpalatable; a plant gathered after the flower stalk had grown more than two feet high would be equally useless. This makes good botanical sense. At this particular stage of growth the plant has marshalled all its energies for the concentrated effort of producing its one and only bloom. In other words it is at this point in time that the highest sugar concentration possible will be present in the very parts collected for food: the caudex and the emerging inflorescence.

Which plants will be ready for picking and cooking can be judged ahead of time, in late fall or early winter, by simply pulling back the rosette of leaves to see if a bud is present, but this is not absolutely necessary. Collection time coincided with the time of new growth--usually February or March.

Once it had been determined which plants were ready for cooking the work began. A long stick of hard wood, such as cedar (Juniperus sp.) or oak (Quercus sp.), was prepared for use in digging out the /nada/. The stick was about three inches in diameter and one end was beveled into a flat, spatulate shape, like an axe or chisel blade. This blade was placed under the base of the plant; the other end of the digging stick was then given a few sharp blows with a rock to wedge the stick securely under the plant. The stick now became a lever which was used to pry the /nada/ from the earth.

Next the plants were trimmed of their leaves, right down to the base, until the white inner core could be seen. The result must have resembled a large trimmed artichoke. The knife used in trimming the /nada/ was an ordinary butcher knife. Long ago, before metal knives were available, stone knives were used. These knives were said to have been made of a special black stone, very sharp, which came from the mountains (obsidian would have been available, through collection or trade, from one of the numerous volcanic fields in the state, as would basalt). This knife was worked into a large pointed oval about eight

inches long and three inches at maximum width. One edge was chipped to provide a cutting surface; the other was left dull so that it could be grasped in the hand. The cutting edge was sharpened as needed by rechipping.

The prepared /nada/ were cooked in a large pit which was used year after year. The pit was lined with stones, large ones on the bottom, smaller ones on top. A huge fire was built on top of the stones and allowed to burn down till the stones were red hot. The coals were raked aside and the prepared mescal was laid on the hot stones. Then the pit was covered over with earth and the mescal was left to roast for two days.

When the cooked mescal was removed from the roasting pit some was consumed right away. The stalk was chewed like sugar cane (indeed, /bikaz/ is the Apache name applied to sugar cane). Slices of the syrupy, freshly cooked nonfibrous heart, called /ikétaz/, were particularly relished. However, the majority of the mescal was scraped and pounded into sheets which were dried and then rolled up for storage. When needed the dried mescal was chopped off with a knife, soaked in water, and either chewed as a sweet, the tough fibers being spat out, or used as a sweetening agent in other foods or beverages just as sugar is used today. (See, for example, the beverage made of the fruit of Rhus trilobata.)

Mescal was used not only for food but also as an article of

trade. It is said that long ago some Apaches would make the lengthy, arduous and sometimes dangerous (due to possible Navajo ambush) trip on foot from the Payson area to Oraibi to trade their mescal, and sometimes pinon nuts, to the Hopis for corn and blankets.

Apache name: /nada/; /nada ɬbayi/, /nada ntliz/, /nada ch'ie/.

In aboriginal times mescal was the most important food to all Western Apache groups except the Northern Tonto, where it was overshadowed by the acorn (Buskirk 1949:354). A San Carlos myth (Goddard 1918:48) refers to "those who lived first on the world" as subsisting on mescal, seeds, and "different kinds of grass."

Most observers of the Western Apache described the preparation and use of mescal. These accounts are quite similar to those given by the Clarkdale Apaches except for the following details. Most sources (e.g. Reagan 1929:146) state that the pit was layered first with firewood and then with stones, instead of the other way around. Two sources (Bourke, in Woodward 1943:40; Buskirk 1949:298) aver that mescal was cut at any time of the year, although Buskirk does add that spring was the best time for gathering and that only plants which showed evidence of readiness to bloom were selected. Numerous ceremonial observances accompanied the preparation of mescal. The most detailed accounts of these observances are given by Buskirk (1949:297-307) and Goodwin (n.d.: 7-16), who also describe the marking processes needed to separate one woman's mescal from another's in the cooking pit in the old days, when large parties gathered and roasted their mescal together. The same authors also more fully discuss the drying techniques. Cooked mescal, fresh or dried, was used for food in the same ways described above and elsewhere in this paper for the Clarkdale Apache. According to Reagan (1929:146) the agave also produced an intoxicating beverage, which was made from the roasted and fermented mescal heart. Finally, it is fairly evident that the Western Apache utilized more than one species of Agave; Castetter, Bell and Grove (1938:33) suggest that these included A. parryi and A. palmeri.

The Eastern Apache gathered, roasted and prepared several native species of Agave in a manner comparable to that of the Western Apache. Mescal was a very important vegetal food--so important that the Mescalero Apache derived their name from it. Expeditions were still being made in the 1930's to obtain the plants (Castetter and Opler 1936: 35-38).

The agave was of primary importance throughout the Southwest. So much has been written about its use that it would be fruitless

to attempt to gather it all together here. Instead, the reader is referred to a fine, comprehensive, comparative monograph by Castetter, Bell and Grove (1938:1-92). Their paper outlines the distribution of Agave spp. in the Southwest, lists the peoples who used the plants for food and/or other purposes, describes preparation methods, and estimates the relative dependence on the plants of those groups who used them for food. It is enough here to say that gathering and preparation techniques were comparable to those of the Western Apache and to quote one of the final paragraphs of the Castetter, Bell and Grove paper: "As regards the utilization of agave for food in the Southwest . . . the only peoples who did not use mescal rather extensively for food were the Pueblos, Navajo, Pima, Papago, Mojave, Yuma, Maricopa and some of the Cocopa, and this because of its scarcity or absence in their territory. The only people who could have been expected to employ it more widely were the Havasupai, the reason for its limited use by them being that they were essentially an agricultural tribe who ordinarily did need to rely upon wild products" (1938:82) (underscoring added).

Ross (1944:41) gives the only analysis of mescal (Agave parryi) that could be located. Unfortunately it is not clear as to how she prepared her sample. However, her figures show a high caloric value and a very high carbohydrate content. The calcium content is also high, and Ross comments that "One serving of mescal pulp furnished more calcium than half a glass of milk." (1944:43-44).

Cirsium spp. (thistle): More than a dozen species of this prickly herb are scattered throughout the State of Arizona. The Apache name /goda hosh/ is applied to at least three separate species of Cirsium (C. pulchellum, C. vulgaris and C. wheeleri) and it is probable that this term is generic for all Cirsium spp. One Apache friend commented that there are "several" /goda hosh/, some with red flowers and some with purple ones.

Only one species, C. vulgaris, was identified as being edible. This may be an error. For one thing, C. vulgaris is an introduced Old World species that, as of 1950, had been reported in only one area of the State, Havasu Canyon (Kearney and Peebles 1950:954). Although it now appears to be spreading rapidly (specimens have been collected or

noted in various parts of Coconino County, and the voucher specimen for this study was collected near Clarkdale in Yavapai County), it was probably not present in large numbers, if at all, in the field work area until quite recently.

Furthermore, the plants are collected for food when they are very young, before flowers, spines or other such distinguishing characteristics appear. When asked how one could tell the /goda hosh/ that was good to eat from the others at this stage of growth the response was that the ones selected for food have "fat" stems, while the others have "skinny" ones and because of this are rejected. C. vulgaris has a fat stem, but so do a few other species relatively common in the area, such as C. neomexicanum. Therefore, it may be the case that several species of Cirsium, including C. vulgaris, are collected for food, the determining criteria being the stem diameter.

As noted above this plant must be collected while still young, before it branches out and develops spines. The young shoots are then stripped of their leaves, peeled, and eaten raw. They are said to be a good salad vegetable.

Cirsium spp. are no longer widely or regularly collected.

Apache name: /goda hosh/.

For the Western Apache, the Goodwin manuscript refers to Cirsium arizonicum being gathered when it was about two feet high. The stalks were eaten raw. Among the Eastern Apache, the seeds of C. pallidum were gathered, but not extensively (Castetter and Opler 1936:49). Apparently the stalks were not collected for food.

Elsewhere in the Southwest, in all the sources consulted, only the

Navajo (Arizona State Museum 1951:46) and the Northeastern Yavapai (Gifford 1936:256) are described as utilizing a species of Cirsium for food. Both ate the raw stems. According to Harrington (1967:168) any species of thistle can provide food if taken at the right stage and properly prepared.

Beverages

The beverages discussed fall into three different categories: teas; crushed fruit beverages; and tulipai, an alcoholic beverage. Each category will be treated separately.

The term for tea in Apache is /tuɬil bidą/. /tuɬil/ is an abbreviated form of the word for coffee; it translates literally to "black water." When /bidą/ is added the entire term is usually translated as "Indian tea," although it is also applied to the white man's tea which is purchased at the store. There are said to be several kinds of /tuɬil bidą/. Only two of the four plants listed below are designated by that term, but all are prepared and utilized in the same manner. The beverages made from these plants are all referred to as "tea" when an Apache is speaking English.

The part of the plant utilized for a tea may vary but the preparation is always the same. A quantity of the plant part is crushed or chopped, added to a pint or more of water and then boiled till the desired strength is reached. The tea is then strained and served hot or lukewarm. Either fresh or dried plant material will yield satisfactory results.

Plants utilized for teas include:

Ephedra spp. (joint-fir, Mormon tea): The Apaches have probably used all available species of Ephedra for tea. E. cutleri and E. viridis

were observed to be in current use. The stems and scale like leaves are boiled for tea.

This is the most well known of the Apache teas and is the only one still collected in quantity.

Apache name: /tuɬil bidą/.

Reagan (1929:157) reported the use of Ephedra nevadensis in making tea. No other reference to the use of Ephedra spp. as a beverage could be located, nor do Castetter and Opler (1936:1-63) mention it for the Eastern Apache.

The Navajo (Elmore 1944:24) brew a tea from E. torreyana; other species of Ephedra are used medicinally rather than as a thirst quencher. The Cahuilla (Barrows 1900:73-74), Papago (Castetter and Underhill 1935:27) and Zuni (Stevenson 1915:67) prepare a tea from E. nevadensis. The Pima use E. antisyphyllitica for the same purpose. Other southwestern groups utilized one or another species of Ephedra, but used the tea medicinally rather than as a plain beverage. All species should produce an acceptable beverage (Harrington 1967:358).

Platanus wrightii (Arizona sycamore): This large, stately tree is common along streams almost throughout the State. The bark was once brewed into tea. It is no longer in use.

Apache name: /gaastlae/.

The sources consulted yielded no mention of the use of sycamore bark to brew a beverage.

Thalictrum (c.f. T. fendleri) (meadow rue): The root of this leafy herb was once dug for tea.

Apache name: /nahiɬ bichuwa/. The name was translated as "black hair." The plant is called by this name because the root appears to be covered with stringy hairs.

According to the Goodwin manuscript the young leaves of Thalictrum fendleri served the Western Apache as spinach (n.d.:102) and the stalk was played with by children, who used it as a drinking straw (n.d.:65). The two descriptions of usage are somewhat contradictory and there may be an error in scientific identification.

Elsewhere there is sparse mention of T. fendleri in the literature. Elmore (1944:48) describes a tea made from the plant by the Navajo. However, it is drunk ceremonially rather than as a beverage, and other sources also indicate that this plant preparation is primarily a ceremonial medicine (Vestal 1952:28; Wyman and Harris 1941:57-58). Robbins, Harrington, and Freire-Marreco (1916:61) list T. fendleri in their ethnobotany of the Tewa but give no use for it. However, one recording of the Tewa name translates to "tea plant."

Woodsia plummerae: The leaves of this cliff and ledge growing fern are said to make a good tasting tea. The plant does not appear to be in common use. This may be at least partially due to the fact that it is neither plentiful nor readily accessible in the immediate area.

Apache name: /tuɬil bidą/.

No reference to the use of Woodsia plummerae as a tea plant could be located. However, the Eastern Apache are known to have used the leaves of another fern, Cheilanthes fendleri, in brewing tea (Castetter and Opler 1936:53).

Six beverages either are or once were made from the crushed fruits of various plants. These include:

Arctostaphylos pungens (manzanita, point leaf manzanita): Manzanita berries could be and occasionally were crushed and made into a beverage. The process was identical to that of Rhus trilobata, described in detail below.

The berries are no longer collected for either food or beverage.

Apache name: /noosh/.

Western and Eastern Apache sources consulted contain no specific reference to a beverage made from manzanita berries.

The Northeastern Yavapai (Gifford 1936:25[illegible]) and most of the Western Yuman peoples (Hicks 1963:159) are reported to have prepared a beverage by pulverizing manzanita berries and mixing them with water.

Carnegiea gigantea (saguaro): One friend reported that she had recently collected saguaro fruits. She prepared a beverage from these fruits by crushing them, adding water, and straining the resulting mixture. The taste was described as being like soda pop.

It is uncertain as to how common this use of saguaro fruit was or is. However, the technique employed appears to be both common and old. It seems probable that a variety of sweet fleshy fruits were once prepared in this manner, either regularly or irregularly. Exactly which fruits were employed may have depended on local availability and/or individual taste.

Apache name: /nanoldzeege/.

The Goodwin manuscript (n.d.:54) states that the juice was squeezed out of saguaro fruit before it was put on the drying frame but makes no reference to the juice itself being used. However, both Buskirk (1949: 317) and Gifford (1940:13) say that the juice was drunk and that this was a universal trait among the Western Apache. Buskirk also describes a beverage prepared by the White Mountain from mashed whole saguaro fruits mixed with water. The mixture was placed in a jar, buried for two days and then drunk immediately (1949:318). It appears that fermentation took place and that this produced a mildly intoxicating beverage. Hrdlička (1908:28) calls a fermented beverage made by the San Carlos "pitahaya wine." He may have been referring to saguaro fruit. Finally, a Clarkdale Apache said that people at San Carlos are again preparing a beverage (nonintoxicating) from saguaro fruit as part of a general revival of interest in old native foods.

It is not clear as to whether any of the Eastern Apache drank the juice of saguaro fruit or prepared a beverage from it, but Castetter and Opler (1936:53) do report that a refreshing, nonintoxicating drink was still being made in the 1930's from the mashed fruit of Opuntia spp.

Elsewhere in the Southwest, the Walapai (Kroeber 1935:51) drank the juice of the saguaro fruit, while the Yavapai (Gifford 1932:210;1936: 260) and the Yuma (private communication from Ruth Underhill cited by Castetter and Bell 1937a:19) mixed the juice with water for a beverage. Several groups, including the Pima and Papago, prepared an intoxicating beverage from fermented saguaro fruit or syrup (Castetter and Bell 1937a:22-25).

Juglans major (walnut, Arizona walnut): A liquid which could serve as either a beverage or a sweet gruel was once prepared from crushed walnuts and dried strips of mescal. The processing is described under Juglans major in the section on nonfleshy fruits and seeds.

Apache name: /ch'iɬ niyé/.

Comparative information is found under Juglans major in the section on nonfleshy fruits and seeds.

Juniperus sp.(cedar, juniper): A beverage made from dried, pounded juniper berries has already been described on p. 28.

Apache name: /gat izee/.

Comparative information is found under Juniperus sp. in the section on fleshy fruits.

Prosopis juliflora (mesquite, honey mesquite): A sweet tasting beverage or gruel may also be prepared from dried mesquite beans. The processing is described on p. 40.

Apache name: /ii yáá/.

Comparative information is found under Prosopis juliflorain the section on nonfleshy fruits and seeds.

Rhus trilobata (skunkbush, squawbush): The beverage prepared from the berries of this common sumac is by far the best known today of the native fruit drinks. It is jokingly referred to as "Apache lemonade" or "Apache kool-aid." Several families still make this beverage and some

travel relatively long distances to collect quantities of the berries for this purpose.

Unfortunately, the drought affected the bushes in the field work area so that many bore poorly or not at all. Moreover, the neighboring National Forest areas were closed at the best picking time due to extreme fire hazard. Therefore, few people were able to collect as many good berries as they would have liked this year.

The berries are ripe and ready to be picked when they are bright red with no trace of green. A few underripe berries will not affect the taste of the beverage but too many green fruits are said to spoil the flavor; therefore, thoroughly ripe red berries are preferred. Picking time is usually middle or late June, whenever the berries are ready.

As soon as possible after picking, the berries are washed thoroughly in water to remove any hairs or stickiness (R. trilobata fruits are often somewhat viscid and/or pubescent). This washing action is said to take away some of the naturally sour taste of the berries. The berries may be used while fresh but are more commonly dried so that they can be stored and used whenever desired in the future. To dry, the berries are spread in a single layer on a pan or tray and placed outside in a warm sunny spot.

In order to make the beverage the berries must first be ground on a stone metate. Apparently some people now use a food grinder or chopper for this process, but others still prefer to use the old grinding stone

and maintain that it produces a better tasting product. If dried berries are used, a little water is sprinkled on them to make the grinding easier. A pint of berries can be ground in about three batches.

The ground berries are now placed in a container with water (about one quart of water to each pint of berries) and allowed to soak for a few minutes. The mixture is then stirred and strained into a pitcher or other container. The berry skins and seeds, trapped by the strainer, are discarded. Sugar is added to sweeten the beverage, the amount depending on the tartness of the fruit and individual taste. In the old days chopped dried mescal was used to sweeten the water used to make this drink. The mescal was left to soak in the water for a short period of time, then squeezed out and thrown away. The ground /nk'oze/ berries were added to this pre-sweetened water and soaked, stirred and strained as just described. The finished "Apache lemonade" is an attractive dusky rose in color.

Apache name: /nk'oze/.

Buskirk (1949:339) and Hrdlička (1908:259) both refer to a beverage which was made from the berries of what was undoubtedly Rhus trilobata. Their descriptions of the preparation of this drink are less detailed but generally duplicate the one given above. A Clarkdale Apache said that /nk'oze/ was still being prepared by many people on the San Carlos Reservation and that it is one of the traditional foods served at a girl's puberty ceremonial (another being acorn soup).

Although Castetter and Opler do not mention it for the Eastern Apache, this beverage appears to have been fairly common throughout the Southwest. The Hopi (Whiting 1939:84), Walapai (Kroeber 1935:55), Havasupai (Whiting 1940-41:113), Yavapai (Gifford 1932:211-12;1936:257) and Cahuilla (Barrows 1900:64) all made this drink. Occasionally the

common rather than the scientific name is used in these sources, but there is little doubt that it is the fruit of R. trilobata which is being referred to. Where descriptions of preparation are given they do not vary from the Clarkdale "recipe."

Only one other beverage was discussed, a sort of corn beer known as tulipai. The Apache name for this alcoholic beverage is /tuɬbai/ (grey water) but the Anglicized version, tulipai, is also known and for the sake of convenience will be used here.

Tulipai is now apparently rarely prepared in this area, although there are a few people around who still know how to make it. Tulipai is basically a fermented corn beverage to which several different plants are added. These plants are said to improve the flavor and increase the strength of the tulipai. Several different plants were mentioned as tulipai additives. No set number or combination of plants is required; the choice is up to individual tastes. A list of possible additives, together with the specific plant part used and the Apache name for the plant, will be found at the end of this discussion. The list should by no means be considered complete; one friend told me that she had once helped her mother collect a total of thirty-two different plants, all meant for one batch of tulipai.

The preparation of tulipai was described as follows: First a quantity of corn is covered with wet burlap and allowed to sprout. When the sprouts have reached a height of about 1 inch the corn is ground on a metate and placed in a large can. The can is filled with water and at this point small quantities of whatever plant additives are desired are chopped up and added. This mixture is boiled for a while

and then removed from the fire and set aside till it begins to bubble (ferment). Now the tulipai is boiled again until it is reduced to one quarter of the original quantity. The mixture is then strained to remove all solids and placed in one or more other containers. Next, each container of tulipai is filled with water, stirred, and sprinkled with wheat. The wheat is considered essential (probably for proper fermentation) and if it is omitted the tulipai may be no good. The tulipai is now allowed to sit again until the bubbles rise. After this second fermentation the tulipai is ready to drink. The whole process, excluding the time required for the corn to germinate and grow, takes about 24-36 hours. Tulipai should be drunk right away; if allowed to sit for too long it will lose its potency and flavor and turn sour.

According to Hrdlička (1904:190), tulipai was brought to the Western Apache by the Chiricahua, who supposedly learned to make it in Mexico. Tulipai was referred to by Buskirk (1949:382) as the most common intoxicating drink of the Western Apaches, both in the past and during the time of her field work. Castetter and Opler (1936:49-52) say much the same thing about the Eastern Apache, but apparently limit widespread usage to the past rather than present (1930's) times.

There are several descriptions of tulipai preparation in the literature. These do not vary significantly from the Clarkdale accounts, except that two sources (Buskirk 1949:383-84; and Woodward 1943:44, who cites an 1859 newspaper report) limit the number of boilings to one. Castetter and Opler (1936:51) add that the Eastern Apache frequently used wheat instead of corn in making tulipai, but the process was the same.

Listed below are the plants mentioned as tulipai additives. These plants are often referred to in English as "tulipai medicines" and many of them actually are medicines in their own right. However, this should not be construed as meaning that the Apaches use or consider tulipai

itself as a medicine. It is thought of primarily as a pleasant tasting beverage which is "good for you" if drunk within reason, but it is not a medicine in the usual sense of the word. Castetter and Opler expressed the same opinion in regard to the Chiricahua and Mescalero Apache (1936: 51). Comparative information on additives is summarized at the end of this list.

Tulipai additives include:

Asclepias spp. (milkweed): One or more species of milkweed have been utilized by the Apache as both medicine and as tulipai additive. Unfortunately no live specimens were available during the course of field work. Identifications were made from a dried specimen (A. asperula) and a color photograph (A. speciosa). Although the same name and information was quoted for both these species it cannot be said with certainty that either or both of these species were the actual ones employed, since there are more than two dozen species in the State, many of which closely resemble one another. A field identification would be much safer. However, there can be no doubt the genus.

The root was chopped and added to tulipai.

Apache name: /idebiskáne/.

Berberis repens (creeping mahonia): The roots of this member of the barberry family were used in making tulipai.

Apache name: /izee nich'il/. /izee/ is the word for medicine and this name was translated as "small medicine." There is another name for this plant, /izee ɬchog/, which means "yellow medicine," but the first name seems to be preferred.

Cercocarpus breviflorus (mountain mahogany): The root of this shrub was used as a tulipai additive.

Apache name: /ges ndazhe/.

Datura meteloides (jimsonweed, sacred datura): All parts of this ill-scented herb are poisonous. The Apaches are aware of this and generally avoid the plant (for a fuller discussion of D. meteloides, see under Medicines). A long time ago it was discovered that one old man from Middle Verde was sprinkling dried, ground up datura root on his tulipai along with the wheat. After that no one would touch his tulipai.

Apache name: /jaa ilgodó/; also /ite godzil tsa/, which means "forget yourself."

Penstemon clutei (beardtongue): The Apache name /dą tiyé jǫzi/ is apparently generic for all species of Penstemon. It was applied in the field to both perfoliate (P. clutei) and nonperfoliate (P. barbatus) species, and it is recognized that this plant has many different flower colors.

The root of P. clutei was specifically pointed out as a tulipai additive, but other species may also have been so employed.

Apache name: /dą tiyé jǫzi/. /dą tiyé/ is the name for the hummingbird and the whole term for this plant undoubtedly reflects the Apache observation of this bird's habits. The term for the plant translates to "hummingbird sucker."

Pinus ponderosa (ponderosa pine): The white inner bark of this large

pine, common at higher elevations in the State, was added to tulipai.

Apache name: /nil chi'/.

Taraxacum laevigatum (dandelion): The roots were used in making tulipai.

Apache name: No Apache name was known.

Thalictrum (c.f. T. fendleri) (meadow rue): The root was used as a tulipai additive.

Apache name: /nahił bichuwa/.

Not available: The numerous deep roots of this plant were chopped up for tulipai.

Apache name: /izee le'it'ii/. This could be loosely translated as "medicine with roots that go down."

Not available: The roots of this low, spreading plant, which has "leaves like pinon" and bears pink flowers, were used in tulipai.

Apache name: /izee liwuzee/. The latter part of this term means "stick you" and apparently refers to the sharpness of the leaves.

The use of additives was an accepted practice among both the Western and Eastern Apache. Western Apache additives other than those listed above include: the root of Euphorbia serpyllifolia, lignam-vitae tree root bark, loco weed [possibly Astragalus sp. or Oxytropis sp.], and peyote bean (Reagan 1929:154); the roots of Lotus wrightii, Cassia couesii, Canotia holocantha and Perezia wrightii, and the inner bark of the mesquite (as sweetening) (Hrdlička 1908:27-28); sugar, yeast, Copenhagen snuff, rum or brandy flavored mincemeat, and several unidentified plant roots (Buskirk 1949:382-383).

Eastern Apache additives included the roots of Quercus grisea and Prosopis glandulosa, and the flowers of Taraxacum officinale and Humulus lupulus neomexicanus. Sugar, mesquite flour or saguaro syrup were added to sweeten the tulipai. The addition of yeast or fermented mescal juice hastened fermentation (Castetter and Opler 1936:50-51).

Miscellaneous

There were five wild foods discussed which do not fall under any of the preceding categories. Two of these are blossoms, two are fungi, and one is a root.

The flowers of two different plants are said to have once been eaten. Both are somewhat fleshy blooms. Preparation was identical for both; they were simply picked in the desired quantity and boiled fresh. Neither has been collected in many years.

These two plants are:

Robinia neomexicana (locust, New Mexican locust): This thorny shrub or small tree has large, showy, purplish flowers. It is common almost throughout the State between the elevations of 4,000 and 8,500 feet, usually in canyons or coniferous forests.

Apache name: /ch'il gojiza cho/.

No mention of the use of these flowers for food by the Western Apache could be located. The Eastern Apache, however, boiled the blooms and ate them as a vegetable and also stored them for future use. They also ate the pods, which were prepared similarly to those of mesquite (Castetter and Opler 1936:42).

The Jemez (Cook 1930:27) gathered R. neomexicana blossoms for food because of their sweet nectar.

Yucca spp. (narrow-leaf yucca): The Apache distinguish two types of Yucca which they see as similar or related. Broad-leaf yuccas, called /iigaaye/, bear a fleshy fruit that is used for food (see p. 22). Narrow-leaf yuccas, called /iigaaye chose/ (/chose/ was translated as "little one"), bear a dry, inedible fruit, but have fleshy white flowers which were once collected for food.

Only one species of narrow-leaf yucca (Y. utahensis) was specifically pointed out as having the edible flowers, but it seems probable that all available species were utilized.

Apache name: /iigaaye chose/.

Both the Goodwin manuscript (n.d.:46) and Buskirk (1949:325) state that these boiled blossoms once served the Western Apache as food. Buskirk adds that they were also dried and stored for future use.

Castetter and Opler (1936:39) say that the flowers of a narrow-leaf species of Yucca were boiled and eaten as a vegetable by the Eastern Apache. Broad-leaf yucca flowers could also be prepared this way but were considered less palatable and so were apparently collected on a much smaller scale.

Elsewhere, few references to the use of narrow-leaf yucca flowers for food are made. The Acoma and Laguna occasionally boiled or baked the young flowering stalks of Y. glauca (Castetter and Bell 1938:14). The Cahuilla and Luiseño boiled the flowers of Y. whipplei (Hicks 1963:14). Harrington (1967:337) found the boiled flowers of Y. glauca very pleasant tasting and noted that in 1920 it was common to find yucca flowers for sale in the food markets of Mexico.

Two types of edible fungi were discussed, the first encompassing the general class commonly called mushrooms, the second a tree growth.

Not available: Mushrooms were once soughtout and collected for food.

Two types or kinds of mushrooms are distinguished. The "good kind" is called /bes jazh/; these were collected and prepared for eating by boiling. The "bad ones" were described as being blackish or spotted; these were considered poisonous and were avoided. No name for the poisonous variety could be remembered, although one woman thought they might have been called /tlegitai/.

Mushrooms are no longer collected. They were gathered within the memory of my oldest friends, but today no one is certain of the differences

between the good and the poisonous kinds. It is generally felt that, under the circumstances, collection would be foolish if not fatal.

There is scant mention anywhere in the literature consulted of the utilization of fungi for food by southwestern groups. Buskirk's field work confirmed the use of "only corn smut [Ustilago zeae] and mushrooms" by the Western Apache, although she cites a 1907 work by Cushing as saying that "many varieties of fungi furnished food" (1949:345). Reagan (1929:144-45;158) also refers to the Western Apache use of corn smut and mushrooms, including Lycoperdon sp., for food. The corn smut was boiled. No preparation technique was recorded for mushrooms.

The Tewa apparently recognized several different fungi but ate only "mushrooms," which were boiled and then fried, and an unidentified fungus which was boiled as a delicacy (Robbins, Harrington, and Freire-Marreco 1916:66-67). "Many of the Pueblo Indians of the Rio Grande Valley" relished the bracket fungi, which were boiled, as was a Fomes sp. utilized by the San Felipe. The Zuni ate Lycoperdon sp., the puffball either fresh or dried (Castetter 1935:33). The Hopi cooked corn smut with sweet corn as a food (Whiting 1939:100).

Not available: One friend recalled another type of fungus which her mother collected and boiled for food; she remembered that it was particularly good when boiled with meat for a stew. She has never collected this plant for her own use.

From her description the plant may have been Polyporus sulfuris, a large, edible, tree growing fungus which has been reported in the area (Gilbertson and Buddington 1970:96).

Apache name: No name could be remembered.

The popularity of bracket fungi among several Pueblo groups has already been mentioned. Jones (1931:38) identified the species used at Isleta as Polyporus harlowii. This fungus was gathered in the fall from cottonwood trees. It should be noted that the Fomes sp. used by the San Felipe also grows on cottonwood (Populus wislizeni) (Castetter 1935:33).

Only one root, technically a bulb, was reported as being collected for food:

Not available: This is still another of the plants which did not come up in this dry year. It is referred to in English as the "wild onion" and is described as having a blue flower. In all likelihood this is probably some species of Allium or possibly Dichelostemma pulchellum.

The plants are still collected when available. The bulbs are pulled and eaten raw.

Apache name: /jiɬ chį́/.

Apparently more than one species of Allium were collected by the Western Apache. Those mentioned in the literature include A. biseptrum (Reagan 1929:155) and A. palmeri (Baldwin 1965:59). The Goodwin voucher collection contains two specimens of A. bigelovii, but no information as to use is given. Several sources also refer to the use of Dichelostemma pulchellum (formerly Brodea capitata) bulbs as food (e.g. Hrdlička 1908:258). Wild onions were eaten raw or cooked (e.g. Reagan 1929:155).

The Eastern Apache used Allium cernuum and A. geyeri to flavor soups and gravy. They were occasionally eaten raw as well (Castetter and Opler 1936:47).

The Navajo (Elmore 1944:31), Hopi (Whiting 1939:70), Tewa (Robbins, Harrington and Freire-Marreco 1916:53), Isleta (Jones 1931:20), Papago (Castetter and Underhill 1935:18) and the Goisute (Chamberlin 1911:339) are all known, at some time in their history, to have utilized one or more species of Allium. The Papago (Castetter and Underhill 1935:18) also ate the bulbs of Dichelostemma pulchellum. The Pima (Russell 1908:76) and Walapai (Kroeber 1935:55) ate "wild onions."

Only one analysis of a wild onion, Allium nuttallii (Yanovsky and Kingsbury 1938:652) could be located, and it does not really give enough information to justify any statement about nutritional value.

Agricultural Products

Today the Apache no longer depend in any way upon wild foods for survival. Wild plants are collected as occasional supplements to and not as staples of diet. A friend told me that once a somewhat patronizing

white woman asked her what Apaches ate. The question was asked at breakfast time and irked my friend a bit. She says she snapped back, "The same things you do--cornflakes, oatmeal, eggs and bacon!"

The following is a list of cultivated plants known to and consumed by the Clarkdale Apache, either regularly or occasionally. The list is not complete; nor is it meant to be taken as a statement about the actual composition of Apache diet.

Most people who have a good supply of water available try to grow one or more small crops. Those plants observed to be currently cultivated are marked with an asterisk (*). Other plants are probably also cultivated.

*Allium cepa (onion).

Apache name: /chewoya/. This name was probably borrowed from the Spanish cebolla. The Apache term for the wild onion is /jiɬchí/ (see p. 69).

Asparagus officinalis (asparagus).

Apache name: /inaa bikaz/. This translates literally to "white stalk."

*Beta vulgaris (beet).

Apache name: None; called by the English name only.

Citrullus vulgaris (watermelon).

Apache name: /tla goiit'áne/; also /k'itááne/. The first name translate roughly to "night time eat one."

Citrus limonia (lemon).

Apache name: /tu bi itɬanii/. The name means "drinking with water."

Citrus sinensis (orange).

Apache name: /ded ink'ozehii/. This translates to "the top [rind] is sour."

*Cucumis melo (cantaloupe, casaba melon).

Apache name: /golúne/ (cantaloupe) and /golúne tslose/ (casaba melon; the latter term refers to the "wrinkled" skin).

Cucumis sativus (cucumber).

Apache name: /ishiin bilit'annii/. Cucumbers and radishes (Raphanus sativus) are given the same name, which means "put salt on it and eat it."

*Cucurbita spp. (squash, pumpkin).

Apache name: /beiɬkan/. It appears that /beiɬkan/, which means "good taste, " is a covering term for all squash, both winter (C. maxima, C. moschata) and summer (C. pepo), and also pumpkin (C. pepo). The varieties of squashes are then named according to "how they look" by adding a descriptive modifier to the basic term. Thus, /beiɬkan bielgochógii/ refers to "banana squash," while /beiɬkan mik'osine izii/ is the name for a large yellow crookneck variety. There are apparently several varieties named in this manner. The term /beiɬkan/ used alone can refer to any type of squash or to pumpkin, depending on context.

Latuca sativa (lettuce).

Apache name: Either /it'ą diwózhe/ or /inaa ba it'ą/.

*Lycopersicon esculentum (tomato).

Apache name: None; called by the English name only.

Musa sapientum (banana).

Apache name: /k'os k'an/. This is also the name applied to the fruit of the broad-leaf yucca (see p. 23).

Oryza sativa (rice).

Apache name: /nada' choze/.

*Phaseolus spp. (beans).

Apache name: /bes ch'oz/. Like the name for squash, /bes ch'oz/ is a covering term which refers to all beans. Specific types are again referred to by adding a descriptive modifier to the basic term. For example, pinto beans (P. vulgaris) are called /bes ch'oz likiizé/; the latter term refers to their speckled appearance. String beans or green beans (P. vulgaris) are named /bes ch'oz dutladahii/, the latter term meaning that the beans are "green and tender."

Pisum sativum (peas).

Apache name: /bes ch'oz dijola/. By the name given to them peas are classed with beans. The name translates to "round beans."

*Prunus armeniaca (apricot).

Apache name: None; called by the English name only.

Prunus domestica (plum).

Apache name: /gagé binaa/. The name translates to "crow's eyes," which perhaps refers to the color of the fruit.

Prunus persica (peach).

Apache name: None; called by the English name only.

Pyrus malus (apple).

Apache name: None; called by the English name only.

Raphanus sativus (radish).

Apache name: /ishiin bilit'aanii/. Radishes and cucumbers (Cucumis sativus) are given the same name, which means "put salt on it and eat it."

Solanum tuberosa (potato).

Apache name: /na mase/.

Triticum sativum (wheat).

Apache name: /tło nawayii/. /tło/ is the word for grass.

Vigna sinensis (cowpea, black-eyed pea).

Apache name: /bes ch'oz nag'ezinii/. By the name given to them black-eyed peas are classed with beans.

*Zea mays (corn).

Apache name: /nadą'/. Like the names for beans and squash /nadą'/ is a covering term for all corn. Again like beans and squash a descriptive modifier is added to the basic term in order to refer to a particular variety. In the case of corn, the modifier usually designates the color of the corn. Thus, /nadą' lichi'ii/ refers to red kerneled corn while /nadą' dutliz/ means blue corn. There are two terms for multicolored corn: /nadą' ikhtá inolinii/ and /nadą' nzunii/. A multicolored variety with large kernels is currently being grown in at least one garden at Middle Verde.

MEDICINE

The section on medicines, more than any other in this paper, is based primarily on information given by only two women, both of whom still collect and use some herbal remedies. Moreover, on roughly half of the plants listed below, the women either disagreed as to specific medicinal use or, what was more often the case, one or the other was previously unaware that the plant could be used medicinally. The disagreements were never arguments, and both seemed to think that it was perfectly natural that they would each know of and use different medicines as well as some identical ones. Their own explanation was that they came from "different places" (one was raised as a child in the Payson area, the other's traditional family home is the Verde Valley) and, therefore, learned some different things while growing up. Perhaps another reason for this differential knowledge can be deduced from casual comments made during the field work period. For example, one friend remarked that "Everything is a medicine." The implication of this and other statements is that there are so many medicines that it is simply impossible for one person to know them all. This is especially true in these days of modern medicine when increasing reliance on doctors and their services has pushed the use of herbal remedies into the background. A friend told me that, when she was a child many years ago, her mother never took any of her family to a doctor but relied instead on her own extensive knowledge of plant medicines. This is no longer the case anywhere in the field work area.

It should be pointed out that the medicines discussed in this section are for the most part simple home remedies. Few are or were ceremonial in nature. These home remedies can be collected and used by anyone who has knowledge and need of them; they are not the exclusive province of the medicine man but rather of the average person. For reasons that should be clear from the preceding discussion it is impossible without further research to make any accurate statement about just how widespread actual knowledge and use of any one particular plant is.

One common method of organizing medical ethnobotanical data is to arrange the plants according to the medical disorders for which they are used as treatment. Such an organization is not practical here. For one thing there are only thirty-odd plants to be discussed. A number of the plants are or were used for specific medical problems, but these cover a very wide range, from diarrhea to tuberculosis. More important is the fact that it is characteristic for one medicine to be used for more than one ailment and frequently a medicine is described as being good "for everything" or "for all of you." Medicines are often combined and taken as a mixture which is said to be more efficacious than the individual medicines alone. These mixed medicines apparently are not taken for a definite problem, such as a sore throat, but rather when a person feels just generally ill or out of sorts. The mixed medicine is then taken to make you feel better and to "build up your blood." Tonic seems to be an apt word for these mixed medicines; and, whenever a plant has been described as being prepared in this manner and used for this purpose,

it has been designated here as a tonic. There is no set formula for a tonic. Composition varies and substitutions can be made. Tonic ingredients, like most medicines, could be used fresh or dried.

Another fairly common method of organizing medical ethnobotanical data is to group the plants according to botanical families. This approach also seems somewhat impractical for these particular data since, of all the plants to be discussed, only two belong to the same family.

Therefore, the plants have simply been arranged alphabetically by their scientific names. Plants which were either unavailable or which could not be adequately identified are listed at the end of this section under Not Available.

Alnus oblongifolia (alder): This large tree is the most abundant and widely distributed species of Alnus in Arizona.

Some Apaches working on a road crew contracted a rather severe case of poison ivy. They reportedly made a lotion of pounded alder bark which they applied to their blistered skin. The lotion is said to have relieved the pain and itching.

Apache name: /k'is/.

The Goodwin manuscript (n.d.:89), referring to what is in all probability alder by its native name only, states that the bark of this tree was boiled with sycamore bark. The medicinal tea was drunk to avoid sickness during measles epidemics.

No other medicinal use of alder in the Southwest could be located. Alder did serve several North American Indian groups outside the Southwest as a medicine, however, and frequently as a soothing, healing wash (Vogel 1970:270). Vogel states that "black alder" was official in the Pharmacopoeia of the United States of America (hereafter abbreviated

as the U.S.P.) from 1820-94. It was used as an astringent and tonic. However, he gave the species as Prinos verticillatus (1970:271), now known as Ilex verticillata. At least one species of Alnus, A. glutinosa, is also known by the common name of "black alder." No explanation for the lumping together of these two unrelated genera is offered by Vogel, and this makes somewhat chancy speculation as to medicinal properties of Alnus. However, alder probably contains some tannins. Tannic acid, an astringent, would offer some relief from the itching of poison ivy.

Asclepias spp. (milkweed): The difficulties involved in quoting the exact species of Asclepias used have already been discussed (see under tulipai, p. 63).

Milkweed root is used as a tonic ingredient. Only a small quantity is mixed in for it is said that this medicine is very strong and if used in larger quantities could have a severe laxative effect. In the words of one friend, too much of this root will "clean you out too good!" Apache name: /idebiskáne/.

The Goodwin manuscript lists several species of Asclepias as being used for medicine by the Western Apache. A. tuberosa roots were taken for a sick stomach (n.d.:101). The milk and a root tea made of A. latifolia were used for sore eyes (n.d.:167). The whole plant of A. subverticillata was boiled for medicine (n.d.:68). A. asperula roots were chewed to relieve pain; the patient was warned not to swallow the roots (n.d.:116).

The Navajo also made extensive use of Asclepias spp. Various species were employed for different disorders, ranging from burns and boils to stomach troubles (Arizona State Museum 1951:36-37; Elmore 1944:69; Vestal 1952:39; Wyman and Harris 1941:61-64). There is one report of the Navajo having used an infusion of A. hallii as an oral contraceptive (De Laszlo and Henshaw 1954:627). Elsewhere in the Southwest very few references to the medicinal use of milkweed could be located. The Hopi (Whiting 1939:87) used A. galioides to increase the flow of a mother's milk and the Tewa (Robbins, Harrington and Freire-Marreco 1916:54) used an unidentified species as a remedy for sore breasts. The Isleta (Jones 1931:23) inhaled the powdered leaves and stems of A. latifolia to relieve catarrh.

According to Vogel, "A. tuberosa, A. incarnata, and A. syriaca were official in the U.S.P., under the name of Asclepias, 1820-63

and 1873-82. The roots have been used for diaphoretic and expectorant purposes, and in large doses are emetic and purgative" (1970:337). The latter part of this statement echoes that made by the Clarkdale Apaches.

Berberis repens (creeping mahonia): The root of this plant was once boiled in a quantity of water and strained. The resulting tea was used in the treatment of tuberculosis. The root was chopped and drunk three times a day.

Apache name: /izee nich'il/; also /izee ɬchog/.

The Goodwin manuscript (n.d.:101) contains a single reference to Berberis repens; the plant was described as a good medicine for stomach ache.

The Navajo are said to have used B. repens as a "cure-all" (Arizona State Museum 1951:23). They made a decoction from the leaves and twigs of this plant to relieve rheumatic stiffness (Elmore 1944:48) and a decoction from the roots for constipation. The plant also provided a lotion for scorpion bite and a ceremonial emetic (Vestal 1952:28). According to Wyman and Harris (1941:56), the Navajo used various Berberis spp. to aid in indigestion. The Hopi (Whiting 1939:76) used B. fremontii to heal gums, and a tonic made from the roots of B. aquifolium is said to have been a "favorite medicine with the California Indians" (Palmer 1878:650). The tonic was used to remedy general disability or to create an appetite.

There has been a fair amount of chemical and pharmacological research done on Berberis and on substances derived from it, such as the alkaloid berberine. It is difficult for a layman to adequately interpret these data. However, among other possible medical applications, Berberis spp. are known to contain various alkaloids of the isoquinoline group. This means that there is a possibility that the plant acts as a narcotic and smooth muscle relaxer. Therefore, the plant may well have aided in the treatment of tuberculosis, for a smooth muscle relaxer would have served to open the bronchial passages, thereby allowing freer breathing.

Canotia holocantha (false palo-verde): This xerophytic, peculiar looking plant with its green, spine-like branches, is widely distributed in Arizona between the elevations of 2,000 to 4,500 feet and can be abundant in some places.

The berries (actually five-valved capsules) were used by women.

The fruits had to be used fresh for they become somewhat woody at maturity. It is said that some women ground these berries to make a tea which they used as a contraceptive. More commonly the berries were chewed after childbirth to alleviate pain and to stop post-partum hemorrhage. Taken in this manner the berries also offered relief from severe menstrual cramping.

Apache name: /ch'a chilii/.

Hrdlička (1908:233), speaking of the San Carlos Apache, says that the "seeds" and root bark of Canotia holocantha were boiled and "used in stomach-ache, diarrhea, and in menstration in cases in which women have 'black blood'." Either the use of this plant for medicine is a Western Apache phenomenon or else other investigators have to date overlooked its use as such in the Southwest, for this was the only ethnographic reference that could be located. Nor could any medical research pertaining to C. holocantha be located.

Cercocarpus breviflorus (mountain mahogany): The root of this plant is made into a tea which is used after the birth of a baby. It eases pain, aids in the expulsion of the afterbirth and generally speeds the return of the mother to normal activites. The root makes a strong medicine which should be taken in small and limited quantities.

Apache name: /ges ndazhe/.

There is limited reference in the literature consulted to the medicinal use of any species of Cercocarpus. Reagan (1929:156) observed that the White Mountain Apache used the powdered charcoal of C. montanus to heal burns. The Navajo prepared decoctions of various Cercocarpus spp. for use as an emetic (Wyman and Harris 1941:56-58). They also used the root and bark of C. montanus for stomach troubles (Elmore 1944:53) and various parts of the same plant in ceremonial cures, as well as to expedite post-partum recovery (Vestal 1952:30). The Tewa mixed the powdered leaves of C. montanus with salt and cold water for a laxative (Robbins, Harrington and Freire-Marreco 1916:45).

No pertinent pharmacological studies could be located.

Cucurbita foetidissima (buffalo gourd, calabazilla, wild gourd): This rank ill-smelling vine with its gourdlike fruits is a common weed throughout the State between the elevations of 1,000 and 7,000 feet.

One friend said that she was told by an old woman that the root of this plant could be used for medicine. The large root should be sliced, heated over a fire and then placed on boils or infections to draw out the pus. She went on to say that she had tried this and that it seemed to work satisfactorily.

The same friend said that she knew this same root also made a very strong laxative, although she had not tried it and preferred other plants which could be used for the same purpose.

Apache name: /nat dil kaali/.

Only one Western Apache source mentions a medicinal use for Cucurbita foetidissima. Buskirk (1949:345) says that the whole plant was mashed and mixed with water and the resulting soapy liquid applied to sores on a horse's back. The mixture was said to "sting like turpentine and was never used on humans."

Other groups in the Southwest, however, have been reported to use the root of C. foetidissima for human medicinal purposes. The Pima (Russell 1908:79) boiled and pounded the root and put the extracted juice in the ear or a hollow tooth to relieve pain, and on open sores to "kill maggots." The Isleta (Jones 1931:27) used the root extract to treat chest pains. According to Robbins, Harrington and Freire-Marreco (1916:63), the Tewa ground the root and mixed it with water to make a laxative. In a footnote to this usage the authors cite the U.S. Dispensatory as saying that the root pulp of C. dagenaria, a gourd, yields a "powerful and even drastic purgative."

Datura meteloides (jimson weed, sacred datura): As mentioned earlier in this paper (p. 64) the Apaches are aware that this plant is poisonous and therefore avoid it. They also know that the plant can be used as a

narcotic, but they emphasize that they do not now and never have used the plant for this effect. One of the names for the plant, /ite godzil tsa/, means "forget yourself"--because that is what will happen to you if you eat, smoke or drink this plant.

However, one woman said that datura was once used as an external remedy. Slices of the boiled root were placed on swellings or running sores to heal them. She added that her mother and grandmother had used the liquid left from boiling the root in water as a wash for a sore or infected ear.

Apache name: /ite godzil tsa/; also /jaa il godo/. /jaa/ is the word for ear.

Reports on the use of datura for any purpose by the Western Apache are somewhat conflicting. Reagan (1929:151) and Hrdlička (1908:28) report at least occasional use of datura as a tulipai additive by the White Mountain Apache. However, by the 1940's, a White Mountain woman stated that they "no longer used" datura in tulipai (Buskirk 1949:386). Reagan (1929:156-57) averred that datura was also used as a disinfectant and as a narcotic, but Burke (1892:455) denies the use of any "poisonous intoxicants," including datura, by the Apache. On the basis of available evidence it appears unlikely that the use of datura as a narcotic was at all common among the Western Apache, if it was indeed present. The commonality of the drug's use as a tulipai additive and/or external disinfectant cannot be determined at the present time.

According to Castetter and Opler (1936:54-55), the Eastern Apache used a few species of plants as narcotics, but they "do not now and apparently never have used" datura for that purpose. These authors also make no mention of the use of datura for other purposes.

Various species of Datura have been used by several groups in the Southwest, either as a medicine or a narcotic or both. Datura is known to have been taken as a narcotic, usually ceremonially, by the following peoples: the Navajo (Wyman and Harris 1941:59); Hopi (Whiting 1939:89); Zuni (Stevenson 1915:46); Yuma (Forde 1931:205); Cocopa (Gifford 1933:305); and Cahuilla (Barrows 1900:75). Most of these tribes also used the plant

medicinally. The most frequent usage appears to have been as a pain killer, taken either internally (e.g. Vestal 1952:42) or, more commonly, applied externally to wounds or sores (e.g. Forde 1931:206). The Cahuilla (Barrows 1900:75) also used the plant to produce death. The plant parts used were various.

The pharmacological action of all Datura spp. has been described as "similar to that of belladonna: parasympathetic, narcotic, anodyne, and mydriatic" (Vogel 1970:328). All plant parts contain various alkaloids, notably atropine (Kearney and Peebles 1960:759) and scopolomine (Youngken 1950:770). The datura alkaloids have an anaesthetic action when used topically; they have also been used pharmaceutically as a drawing salve for external wounds. Furthermore, the stems of three Datura spp., including D. meteloides, have been found to contain antibiotic substances active against Sphacelia segetum (Celayeta, as abstracted in Chemical Abstracts 55:5647b, 1961), a member of the staphylococcus family, which causes external infections. Now this is speculation, but based on this information, it appears that datura preparations may be antibiotic, as well as pain killing and drawing--all of which suggests that the plant adequately served the external purposes cited for it by the Western Apache and other southwestern groups.

"The dried leaf and flowering or fruiting tops of D. stramonium were official in the U.S.P., 1820-1950, and in the National Formulary [hereafter abbreviated as the N.F.], 1950-1965. The seed was official in the U.S.P., 1820-1905, and the root from 1842-1863" (Vogel 1970:328).

Ephedra spp. (joint-fir, Mormon tea); Although the tea made from the stems and leaves of Ephedra is primarily thought of as a beverage (see p. 54), it is also reported to help relieve backache. One woman also mentioned that this plant was used as one of the medicinal steams in a curing ceremony performed for her many years ago when she had tuberculosis.

Apache name: /tuɬil bidą/.

Ephedra viridis is reported to have been used by the Western Apache as a cough medicine (Hrdlička 1908:233) and E. nevadensis as a remedy for venereal disease (Reagan 1929:154;157). Both medicines were taken internally, usually in the form of a tea.

The use of a tea made from one or another species of Ephedra in treating venereal disease was not uncommon in the Southwest. The Navajo (Elmore 1944:24), Hopi (Whiting 1939:63), Zuni (Stevenson 1915:49), and

Pima (Russell 1908:80) all used the plant for that purpose. Nor was this usage limited to the Indians. One of the English common names for the plant, teamster's tea, came about because of its popularity as a remedy among early teamsters who contracted venereal disease during their journeys in New Mexico, Arizona and southern California (Palmer 1878:653).

Ephedra spp. had other medicinal uses in the Southwest. The Navajos took the tea as a diuretic (Wyman and Harris 1941:60), as a cough medicine, and for stomach troubles (Elmore 1944:24). The Tewa used an Ephedra sp. tea for diarrhea (Robbins, Harrington and Freire-Marreco 1916:46). The leaves and stems of the plant were pulverized or boiled and then applied to sores by the Cocopa (Gifford 1933:268), and made into a lotion applied to itching skin by the Isleta (Jones 1931:28).

The drug ephedrine, commonly administered as an astringent and as a mild substitute for adrenalin, is obtained from a chinese species, E. sinica (Kearney and Peebles 1960:60). However, various studies have demonstrated that this drug is absent or present in only trace amounts in southwestern species of Ephedra (e.g. Read and Feng, as abstracted in Chemical Abstracts 22:1993[1], 1928). The American species are well stocked with tannin (Zigmond 1941:105), however. Tannic acid has a variety of medicinal applications, several of which are mentioned elsewhere in this paper. Among other things, tannic acid can act the same as ammonium chloride, by virtue of its alkalinity, and therefore can act as a diuretic. By washing out the kidneys, a diuretic can sometimes relieve backache.

Eriodictyon angustifolia (mountain balm, yerba santa): The resinous leaves of this shrub, common in chaparral areas of the State, are used for minor respiratory ailments. The leaves can be boiled into a tea taken for colds; twice a day is considered a good dosage. The leaves may also be chewed to relieve a cough.

Apache name: /ch'il chek/. The name translates loosely to "sticky bush." One woman refers to this plant as /ch'il chek cho/, "big sticky bush," to distinguish it from creosote (Larrea tridentata), which also bears the name /ch'il chek/.

The Goodwin manuscript (n.d.:98) calls Eriodictyon angustifolia a "good medicine" but does not specify a usage. Strangely enough, this was the only comparative reference that could be located other than

Palmer's statement that the yerba santa, E. californicum, is "a great medicine among the Indians of southern Utah, Arizona and California." These Indians, still according to Palmer, smoked, chewed, or drank a tea made from the plant's leaves for lung affections, and also made a decoction of the plant which was taken, internally or externally, for rheumatism or partial paralysis (1878:651). The Mexicans are known to have used yerba santa for coughs (Corbusier 1969:285).

E. angustifolia and E. californicum are closely related species and are known to intergrade with one another. The latter species was an official drug in the U.S.P, 1894-1905, 1916-47, and in the N.F. from 1947-. The powdered leaves have been used as an expectorant and to disguise the bitter taste of other medicines (Vogel 1970:400). Its current (1965) usage in the N.F. is as an aromatic syrup. The plant has been found to contain a substance antagonistic to gram-positive and acid fast organisms (Salle, Jann and Wayne, as abstracted in Chemical Abstracts 45:8081d, 1951), which means that it should be excellent for respiratory infections in general and could have a beneficial effect in treating bacterial pneumonia and tuberculosis (Appelgren 1971:personal communication).

Foquieria splendens (ocotillo): The ocotillo is one of the oddest and most conspicuous of the Arizona desert plants. It is common in dry areas below 5,000 feet.

According to one friend, the roots of the ocotillo make a good and very powerful medicine. A tea made from these roots will "clean you out" from top to bottom: it will simultaneously clear your sinuses and act as an efficient diuretic and laxative.

Another friend knew about this use of ocotillo but did not consider it an Apache medicine.

Apache name: /ges choze/.

The only references to the medicinal use of ocotillo concern the Apaches. Hrdlička observed that the San Carlos took a decoction of ocotillo root for gonorrheal dysuria. They also applied the pounded root to swellings after having first scarified the skin somewhat with a piece of glass. The hot liquid from the boiled roots was used as a bath for sore limbs (1908:233;234). Kearney and Peebles (1960:640), citing one Mrs. Collom, also mention the last two usages for the Apache.

Geranium caespitosum (cranesbill): This red flowered herb is common in pine forests in the State.

A medicinal tea is made from the root. The tea is considered a good remedy for most stomach disorders. It is also considered helpful in the treatment of contagious diseases such as measles.

Apache name: /ka izee/; also /izee lichi'ii/. At least one other herbal medicine is also called /izee lichi'ii/ (red medicine). This plant, which unfortunately could not be properly identified, will be discussed towards the end of this section.

In all the literature consulted, only the Navajo have been reported to use Geranium spp. medicinally. G. caespitosum was taken for over-exertion (Arizona State Museum 1951:29-30). A decoction of Geranium spp. was used as a diuretic (Wyman and Harris 1941:61). A moist poultice for external injuries was made of the root and leaves of G. lentum; a decoction of the same plant was drunk for internal injury. Two other species of Geranium served as ceremonial medicines (Vestal 1952:34).

The dried rhizome of a wild North American species, G. maculatum, was official in the U.S.P, 1820-1916, and in the N.F., 1916-36. It was used as a tonic and astringent (Vogel 1970:391). Pschenichnova and Gubina (as abstracted in Chemical Abstracts 71:19791w, 1969) found an extract prepared from G. pratense to be "antibacterially active" in concentrations of 0.5-1.0%, with low animal toxicity. An earlier study by Galanti and Manil (as abstracted in Chemical Abstracts 49:13594e, 1955) tested fresh leaf extracts of several Geranium spp. Seven were found to be more or less active against certain test organisms, most of which are normally not disease producing in man. However, one of these organisms, Escherichia coli, can cause dysentery. Finally, if the Geranium spp. used do have astringent properties, then they would have had several possible medicinal applications, including gastro-intestinal disorders. Astringents are used in the treatment of diarrhea and gastric hemorrhage. They are also known to reduce inflammation of the mucous membrane caused by mechanical irritants. Mechanical irritant is a technical term which, among other things, refers to sand and ground stone, varying quantities of which were probably ingested frequently by all metate using peoples.

Heuchera versicolor (alum root): This attractive flowering herb is found in cool shady places in coniferous forests.

The roots of this plant are dried and boiled into a tea which is taken "for everything." It is said to be a good medicine whether used alone or as a tonic ingredient.

H. versicolor is classed as an /izee dighini/, which means that it is a powerful medicine, one that is sure to heal. /dighini/ is a descriptive term which usually indicates connections with ceremonial singing and the medicine man.

Apache name: /biji' jilnijoɬe/.

No source containing a reference to the medicinal use of Heuchera by the Apache could be located. However, the Navajo are known to have used the root or leaves of at least three Heuchera spp. for various disorders, including stomach ache (Arizona State Museum 1951:25-26; Elmore 1944:52; Vestal 1952:29-30). A decoction of the roots of a Heuchera sp. was a popular remedy among the Goisutes for intestinal disorders and was also used by them as a secondary treatment in accidents and other disorders (Chamberlin 1911:350).

The dried rhizome and roots of a related species, H. americana, were official in the U.S.P., 1880-82. They were used as an internal and external astringent, but have since been largely replaced by tannic acid (Vogel 1970:271). There are several medicinal uses for astringents, many of which are discussed elsewhere in this paper. See, for example, Geranium caespitosum in this section for a discussion of the applications of astringents in gastro-intestinal disorders.

Iris missouriensis (wild iris, blue flag): The lovely wild iris closely resembles the cultivated species of iris but is somewhat smaller. In the State of Arizona this species grows in wet meadows between the elevations of 6,000 and 9,500 feet.

The rootstock of the wild iris is chopped and chewed as a laxative. It is said to be a potent medicine and one should take only small amounts at any one time.

Apache name: /teeɬ izee/. /teeɬ/ is the name for the cattail (Typha domingensis). The wild iris is called after the cattail because its leaves resemble those of that plant.

The Goodwin manuscript reports that the roots of Iris missouriensis were used as a tonic (n.d.:105) and also as an antidote for food poisoning, since they were recognized as an emetic and purgative (n.d.: 115). The Northeastern Yavapai (Gifford 1936:261) and the Ramah Navajo (Vestal 1952:21) are both known to have employed this plant, the former as a purgative and the latter as a ceremonial emetic.

Vogel (1970:283) calls the wild iris "one of the most widely used of all American aboriginal medicines." Its effectiveness as a cathartic and emetic can hardly be doubted and is apparently due to the acrid resins present in the rootstocks of several native species, both eastern and western. Again according to Vogel (1970:284), the dried rhizome of I. versicolor and I. virginica were official in the U.S.P., 1820-95, and in the N.F., 1916-42 under the name of blue flag; the medicine was employed as a cathartic, emetic and diuretic. In large doses this plant is probably poisonous. I. missouriensis and I. versicolor have both been reported to cause livestock poisoning (Harrington 1967:34).

lans major (walnut, Arizona walnut): Walnuts were once used as a combination dandruff remedy and hair dye. The nuts were pounded whole until relatively fine, then mixed with water and rubbed well into the scalp. A towel or other binding was wrapped around the head and the mixture was left on for as long as one could stand it. A day or so was not considered an overlong period of time. When the treatment was over, the towel was removed and the hair thoroughly rinsed.

Other plants have been used in a similar manner; see also mesquite (Prosopis juliflora) and canaigre (Rumex hymenosepalus) in this section. Apache name: /ch'iɬ niyé/.

No comparable use of walnuts in the Southwest was mentioned in any literature consulted.

Walnuts have been used as a brown dye in the Southwest (e.g. Bryan and Young 1940:73) and conceivably would dye hair as well as wool or leather. Walnuts contain an appreciable amount of tannin. One study found 22.2% tannin in the green shells of an unidentified species (Paessler, as abstracted in Chemical Abstracts 11:3463[1], 1917). The drying or burning effect of the tannic acid combined with the abrasive effect of the crushed shells probably did relieve scalp flaking, at least temporarily. However, the treatment does seem a little drastic by today's standards!

Juniperus spp. (juniper, cedar): As noted earlier in this paper, the Apaches distinguish between different types of "cedars." Only one type (probably J. monosperma; see p. 28) has an edible berry, but the leaves of any kind of cedar can be used as medicine. J. deppeana and J. osteosperma were definitely identified in the field, and there are probably other trees classed as "cedar" as well.

The tea made from boiling cedar leaves seems to have been looked upon by some as a true all-purpose medicine. One woman smiled and said that her uncle had used cedar for everything from an eye wash to a curative soak for sore, tired feet! The most common use of this aromatic tea, however, was as a remedy for coughs and colds.

According to one friend cedar tea was also used to aid in a difficult childbirth. The disorder described sounded like prolonged labor with excessive hemorrhage. The medicine helped to stop the bleeding and speed the baby on its way. My friend added that some women, including herself, used to take cedar tea regularly for the last two months of

pregnancy in an effort to forestall such problems. The tea could also be taken by nonpregnant women before menstruation to insure a regular and healthy flow.

Apache name: There are several names for cedar. The term /gat izee/ seems to be reserved for the cedar with the edible berry (probably J. monosperma), while the term /gat/, taken alone, is said to refer to "all cedars." It was noted earlier in this paper that the term /tatle/ is translated as meaning juniper or cedar berries in general. /tatle dutlizee/, "blue cedar berry," is a name which seems to be limited to J. osteosperma, and /tatle ɬchi'/, "red cedar berry," is the name given to J. deppeana (alligator bark juniper). The term /diɬ izee/, "blood medicine," refers to the childbirth remedy made from cedar leaves and it can also be used to refer to the tree itself. There are probably still other names, and the whole problem of the classification and nomenclature of cedars deserves further research.

For the Western Apache, Buskirk (1949:335) reports that a poultice made of heated juniper branches was applied to the back of a patient suffering from pneumonia. Reagan (1929:158) implies a somewhat broader medicinal use of cedar. A tea made from the leaves of various species of Juniperus was taken for coughs and colds and also by women previous to childbirth "to cause muscular relaxation." Heated juniper twigs were rubbed on people "as a remedy for fits." There is no reference to a medicinal use of juniper by the Eastern Apache in Castetter and Opler (1936:1-63), but these authors really did not attempt an investigation of native remedies. However, Opler (1969:228) mentions the use of juniper needles as one of several medicines used during a flu edpidemic.

The leaves and branches and, rarely, the berries, of Juniperus spp. were used medicinally by a large number of southwestern groups. Indeed,

a brief review of the literature indicates that juniper was one of the most common pharmaceuticals in this area. Juniper was used in various ways to cure various ills, and the list is too long to practically reproduce here. One of the more common uses was as a treatment for coughs and colds (e.g. Whiting 1940-41:170). However, one of the more interesting as well as more common utilizations of juniper was associated with childbirth. The Navajo (Vestal 1952:11), Hopi (Whiting 1939:62), Tewa (Robbins, Harrington and Freire-Marreco 1916:40), Jemez (Cook 1930:24), Isleta (Jones 1931:33) and Zuni (Stevenson 1915:55) all used juniper at this time. Usually a tea was made from the leaves of the tree and given to the mother for varying and often prescribed lengths of time after childbirth. The Hopi, for example, required the mother to take this tea immediately after giving birth and also stipulated that all of her food be prepared with some of the decoction for twenty days thereafter (Whiting 1939:62). This pattern was not ironclad in the Southwest. The Zuni, for another example, gave the tea both prior to and following childbirth, in the first case "to promote muscular relaxation" and in the second to "hasten cessation of catamenia" (Stevenson 1915: 55).

Most of the pharmaceutical research on Juniperus spp. appears to have concentrated on the berries, some of which have contributed official drugs. However, one study of the leaves of J. communis, a European species naturalized in North America, revealed a vitamin E content of 39.5 mg% (Kaludin, as abstracted in Chemical Abstracts 1968: 75723a). Also, the leaves probably contain some vitamin C (Vosburgh 1971:personal communication). Both vitamins would have made a valuable contribution to pre- and post-natal diet; vitamin C, for example, is necessary in the clotting of blood. In the form in which the leaves were administered (tea), vitamin C, a water soluble vitamin, would have been much more readily available than vitamin E, a fat soluble vitamin. All of this is, of course, pure speculation, and analyses of the prepared tea would be needed before any firm statement about the presence of either vitamin or their contribution to maternal diet could be made.

As for coughs and colds, the leaves may contain at least some juniper tar, which has been used as an expectorant.

Finally, the young leafy twigs of J. virginiana, a North American species, were official in the U.S.P. as a diuretic from 1820-94 (Vogel 1970:290).

Larrea tridentata (creosote bush, sometimes erroneously called grease-wood): This evergreen shrub, common throughout the State at elevations below 5,000 feet, often occurs in nearly pure stands, some stretching for many miles.

Creosote leaves are used as a remedy for tired or sore, cracked feet. The leaves are boiled and the feet are soaked in the warm liquid. The leaves can also be boiled and strained and the resulting tea drunk for stomach ailments. It is said to have a laxative effect.

Apache name: /ch'il chek/.

The White Mountain Apache (Buskirk 1949:346) "fried greasewood" (probably Larrea tridentata) and rubbed it on the body for rheumatic pains. The San Carlos (Hrdlička 1908:233) used the heated branches of the same plant for the same purpose. Palmer (1878:654) referred to the "Apache Indians" as using the gum of L. mexicana as a styptic.

Several groups in the Southwest have used the leaves and branches of creosote bush medicinally. The maladies treated with creosote bush were various--the Papago, for example, thought of creosote as a "universal remedy" (Castetter and Underhill 1935:64)--but usually included one or more of those treated with creosote by the Western Apache; i.e., sore feet, gastro-intestinal ailments, and rheumatism.

Vogel (1970:297) says that "an exudate, called Sonora gum, is extracted from creosote bush. An infusion of the leaves has been used in throat, bronchial, and pulmonary complaints. The constituents of this product include resin, mucilage, a volatile oil, and cresols or phenols." Bollada (as abstracted in Chemical Abstracts 45:2588i, 1951) found that extracts of Larrea tridentata contained analgesic principles which relieved pain in neuritis, sciatica, and inflammations. The applications of an analgesic in treating rheumatic aches and pains should be obvious (note that the treatment apparently also often included the use of heat, which in itself would be soothing). A pharmacist, after reading the Bollada abstract just cited, remarked that the plant probably contains guaiac, which was formerly used by our own medical practitioners for rheumatism (Mitchell 1971:personal communication).

The same pharmacist also observed that analgesics, particularly those containing volatile oils (as is likely in the case of L. tridentata), would have beneficial effects on some stomach ailments. Volatile oils act as carminatives in that they soothe the walls and lining of the stomach, and relieve gaseous distension of the stomach and intestines.

Opuntia spp. (prickly pear cactus): The root of the prickly pear cactus can

be boiled into a medicinal tea. The tea is said to be quite effective as a diuretic and laxative.

The pad of the prickly pear is used as a poultice. First the pad is detached from the cactus and its spines burned off; one method of doing this is to place it in a hot oven for a short period of time. Once the spines have been removed, the pad is cut in half. It is sliced just like a hamburger bun is sliced so that as much interior surface as possible is exposed. The cut surface is placed against a boil or infected wound and it works to draw out the pus. The poultice is changed as often as needed until the wound is judged to be adequately drained.

Apache name: /hosh/.

Buskirk (1949:320-21) reported that the Western Apache thought of prickly pear sap as a cure for sores and that they used the split "leaves" for burns. She also described the use of boiled cholla roots as a baby laxative by the Canyon Creek band (1949:322).

A few groups in the Southwest have been observed to use Opuntia spp. medicinally. The Navajo used Opuntia to treat boils, but the exact method is not clear in the written report (Wyman and Harris 1941:64). Cook (1930:25) says that the Jemez used the hot fruit skin of the prickly pear to heal boils; [fruit skin may be an error for the pad]. The Isleta used the roasted "leaves" of another cactus, Echinocereus coccina, as a poultice for swellings (Jones 1931:28). The use of Opuntia spp. root as a laxative was not mentioned in any of the non-Apache sources consulted, nor was any research located pertaining to the possible pharmacological properties of the genus.

Opuntia whipplei (cholla): The yellow, spineless fruit of this cactus was once worn around the neck as a charm to keep sickness away from the wearer.

Apache name: /hosh gaai/.

Hrdlička (1908:231) records a term for a cholla, Opuntia emorcyi,

which is similar to the term given by the Clarkdale Apache to O. whipplei. According to Hrdlička, the San Carlos used O. emorcyi as a charm to keep away disease. A woody portion of the cactus was put on a string around children's necks, and occasionally whole plants were placed ritually around the dwelling for this purpose.

The root of O. whipplei was "chewed raw or pounded, boiled and the liquid drunk in conjuction with Sphaeralcea sp. for diarrhea" by the Hopi (Whiting 1939:86).

Penstemon clutei (beardtongue): As pointed out earlier in this paper the term /dą tiyé jǫzi/ is probably generic for all species of Penstemon (p. 64). Although the root of P. clutei was specifically pointed out as a tonic ingredient it seems likely that other Penstemon spp. may also be used in this manner.

Apache name: /dą tiyé jǫzi/.

According to the Goodwin manuscript (n.d.:79), the roots of Penstemon barbatus were boiled and drunk "for all kinds of sickness, cough, bellyache." A statement in the manuscript (n.d.:106) also implies that different "kinds" [species?] of Penstemon were used in the same way. Reagan (1929:159) referred to P. torreyi as a "magic medicine." Among the Eastern Apache, Hrdlička (1908:236) mentions a Mescalero use of the leaves and stems of Penstemon for relief of groin swelling and soreness in gonorrhea.

Elsewhere in the Southwest, in the sources consulted, only the Navajo have been reported to use this genus medicinally. They utilized several different species for a wide range of disorders, several of which are listed in Wyman and Harris (1941:55;57;62;63;65).

No pharmacological research could be located.

Platanus wrightii (Arizona sycamore): The tea made from the bark of this tree was looked upon primarily as a beverage. However, one woman said that once when she was younger she was ill with fever, headache, and a bad nosebleed. Her brother fixed her some sycamore bark tea and told her that this was a remedy he had learned from their grandfather who was a medicine man. The tea made her feel much better.

Apache Name: /gaastlae/.

A Western Apache medicinal use for sycamore has already been discussed under Alnus oblongifolia, p. 76. No other reference to a Southwestern medicinal use could be located.

Prosopis juliflora (mesquite, honey mesquite): Only one woman knew of any medicinal uses for mesquite. She said that when she was small she occasionally contracted a case of what may have been conjunctivitis. Her eyes would get sore and red, and the lids would be stuck together with pus. To cure this her stepfather would take mesquite leaves and mix them with salt and water. He then strained the mixture and bathed her eyes with the liquid. Since her stepfather was Spanish she thinks of this as a Spanish remedy rather than an Apache one.

The same woman described another use for mesquite. A quantity of mesquite pitch was mixed with clean river mud and rubbed into the hair. The head was then wrapped with a towel and the mixture left on overnight. The next morning the hair was rinsed thoroughly. This treatment is said to simultaneously dye the hair black and rid it of dandruff.

Apache name: /ii yáá/. The term for pitch of any kind is /jee/.

The Goodwin manuscript (n.d.:113) describes a treatment for hair similar to the one above. The mesquite pitch and mud combination is said to dye the hair black and prevent split ends. Hrdlička (1908:237) also reports a "sore eye" remedy made from mesquite leaves, again similar to the one described above, but lists it for the Mescalero rather than the Western Apache.

Corbusier (1968:33) outlined a delousing treatment that made use of mud. The mud or clay was plastered on the head and allowed to remain for 12 hours before washing out. He observed that this treatment "effectually smothered" any "vermin" harbored in the hair. Corbusier is probably here referring to the Yavapai, although it is sometimes unclear in his work whether he is describing the Yavapai, Apache, or both.

The Isleta (Jones 1931:39) are known to have boiled the leaves and pods of Prosopis glandulosa to make an eye medicine, while the Pima (Russell 1908:79) used mesquite gum for the same purpose. Castetter and Bell (1937b:37-38) describe a great variety of remedies prepared from mesquite by various groups in the Southwest, including a lotion for sore eyes said to be used by "some of the Mexicans and Indians."

No pertinent pharmacological reports could be located.

Rumex hymenosepalus (canaigre, wild rhubarb): This coarse herb is common in many areas of the State below 6,000 feet. It is found along roadsides and in sandy stream beds and fields.

The large canaigre roots are chopped and boiled into a tea used to relieve upper respiratory infections. The tea may be drunk for a cold or gargled for a sore throat.

The root also provides an antiseptic powder. First the fresh root is thinly sliced and then the slices are carefully dried and ground on a metate to a fine powder. The powder is sprinkled on cuts or sores and the wound bandaged. Canaigre powder is also said to dry up and heal "wet" rashes.

The liquid made from boiling the root can also be used as a dandruff treatment.

Apache name: /jiɬ dozhe/.

Hrdlička (1908:232) refers to a decoction of the root of Rumex hymenosepalus being taken for cough or consumption. Reagan (1929:160) reports that the leaves of R. mexicanus were made into a tea taken for sore throat or to induce pregnancy (it is conceivable that there is an error there in identification of species or plant part used). The Goodwin manuscript (n.d.:167) says that the root of R. hymenosepalus was boiled and the resulting steam used directly to relieve diarrhea. The Eastern Apache (Opler 1969:246) have also been reported to use an unidentified species of Rumex to cure diarrhea.

Rumex spp. roots have been medicinally utilized by several groups

in the Southwest, including the Navajo (Vestal 1952:24), Hopi (Whiting 1939:73), Zuni (Stevenson 1915:59), Yavapai (Gifford 1936:261), Pima (Russell 1908:80), and Papago (Castetter and Underhill 1935:64;65). The roots were most commonly used to cure colds, sore throats, and sores on the body. Species utilized included R. mexicanus, R. crispus, and R. hymenosepalus.

According to Vogel (1970:398), "R. obtusifolius was official in the U.S.P., 1820-1905, while R. crispus was listed in the U.S.P. 1863-1905, and in the N.F., 1916-36. At one time they were used for treatment of skin diseases and for alterative and depurative purposes; later they were used as laxatives and tonics."

The species of Rumex found in the State of Arizona are fairly closely related but probably vary in the amount of root tannin possessed. The roots of R. hymenosepalus are known to have a high tannin content. Hill (1952:125) reports a tannin content of 30%. An analysis of roots from 12 localities by Rogers and Russell showed a range of 9.0 to 32.1% tannin (as abstracted in Chemical Abstracts 39:1557[8], 1945). According to the Merck Index (Stechner et al. 1968:1012) tannic acid is used topically as an astringent and styptic, and has been used internally as an antidote for poisons, as an astringent in gastric hemorrhage and diarrhea, and externally as a dressing on burns. The roots of R. hymenosepalus probably served the southwestern Indians well for the usual purposes for which they were employed.

Finally, it may be of interest to note that a polymeric tannin fraction of the root of R. hymenosepalus has been found to display anti-tumor activity (Buchalter 1966).

Sambucus neomexicana (elderberry): There are several species of elderberry scattered throughout the State. S. neomexicanan is a montane species which grows between the altitudes of 5,000-9,000 feet.

The tart berries were boiled into a kind of tea which was taken as an emetic.

The berries were reportedly never collected as food.

Apache name: /suul/.

The Goodwin manuscript (n.d.:72) does mention the use of Sambucus neomexicana as an emetic, but refers to the flowers being boiled rather than the berries. Two sources state that elderberries were used for food: Reagan (1929:160) refers to S. racemosa, and Baldwin (1965:61) to S. canadensis. The Eastern Apache (Castetter and Opler 1936:46) made jam out of S. microbotrys.

Apache (Castetter and Opler 1936:46) made jam out of S. microbotrys.

A few other southwestern groups, such as the Yavapai (Gifford 1936:256), are known to have collected elderberries for food, but no reference to a medicinal use of Sambucus spp. could be located.

Elder flowers are known to be diaphoretic and stimulant (Youngken 1950:837). Elder flowers and berries were both listed in the U.S.P. for a time, but not for properties which would seem to make either particularly valuable as an emetic. Vomiting may have been induced by the volume of fluid taken, and perhaps by a possibly sour taste in the case of the berries, rather than by any pharmacological property of the plant. Wyman and Harris (1941:57-58) observed much the same thing about some of the Navajo emetics.

Sphaeralcea coulteri (globe mallow, sore-eye poppy): S. coulteri, an orange flowered herb, is usually found below 2,500 feet in sandy areas.

The root of this plant is chopped and then boiled down to a jelly which is taken to relieve diarrhea. In English this plant is sometimes referred to as "baby medicine," since it is said to be particularly good for children suffering from diarrhea. However, the medicine can be and is taken by people of all ages.

This may be the only species of Sphaeralcea used this way. S. fendleri was recognized as similar but uncertainty was expressed as to whether this species was an equally effective medicine.

Apache name: /izee dit'iihee/.

The Goodwin manuscript refers in several places to what may or may not be species of Sphaeralcea, but it is nowhere clear as to which species was or were used for medicine or for what specific purpose.

The Pima (Russell 1908:79) boiled the leaves of S. angustifolia to cure diarrhea; an extract of the same plant's roots was used for biliousness. The use of a Sphaeralcea sp. root for diarrhea by the Hopi has already been mentioned (see p. 93). The Navajo used several Sphaeralcea spp. for various medicinal purposes, but not, apparently, for diarrhea (Arizona State Museum 1951:31-32; Vestal 1952:36; Wyman and Harris 1941:55).

No pharmacological information could be located.

Xanthium saccharatum (cockleburr): This is a common weed throughout the United States. The prickly burrs are especially troublesome in pastures where they clot the manes and tails of horses and occasionally cause death to young stock which ingest them.

The leaves are dried and ground to a powder which is mixed with water and used to bathe and heal sores and wounds. The use of this medicinal plant is said to have been learned from the Mexicans.

Apache name: /izee inkozee/.

Reagan (1929:161) reports that "a blood medicine" was made from the roots and leaves of Xanthium commune.

Elsewhere in the Southwest, Xanthium spp. were put to a variety of medicinal uses. The Navajo made a liniment of X. commune to remove excess perspiration (Elmore 1944:90), while the Tewa used the plant as a remedy for diarrhea and vomiting (Robbins, Harrington and Freire-Marreco 1916:49). The Pima mixed X. commune burr pulp with soot to treat sore eyes (Russell 1908:80). The Zuni made a paste of ground X. commune and squash seeds which was applied externally "to extract cactus needles or splinters, to heal wounds from nails, and for similar purposes" (Stevenson 1915:62). Finally, the Jemez made a decoction of an unidentified Xanthium sp. which was drunk for urinary disorders (Cook 1930:28).

Little pertinent pharmacological information on Xanthium could be located. However, according to Kearney and Peebles (1960:896) "some of the species yield an extract that is said to have styptic properties." Also, at least one species, related to those of Arizona, X. strumarium, has been found to contain considerable quantities of iodine in all plant parts (Leonova, as abstracted in Chemical Abstracts 52:8365c, 1958). If this is true of the Arizona species, then an infusion of the plant should exhibit some antibacterial activity, thus making it helpful in the treatment of external wounds.

Not available: The numerous roots of this plant were chopped up and boiled for a tea which was taken for various minor ailments, such as colds. The roots were also used as a tonic ingredient.

Apache name: /izee le'it'ii/.

Not available: This plant was described as a small bush with orange flowers which bloom in the summer. It is known to grow in the Oak Creek area.

When available the roots are chopped and used as a tonic ingredient. This medicine is said to be particularly effective when combined with /izee lichi'ii/ (see p. 101).

Apache name: /izee lidáání/.

Not available: Many years ago long trips were made to secure the root of this plant. It is believed to grow in the Payson area and also in the Three Peaks area near Roosevelt. The plant is known to grow in water and to have a long, thick, chambered tap root. When the medicinal root is sliced each slice resembles the track of a mountain lion; this is presumably why the plant is named /ma' cho izee/, mountain lion medicine. From the description given the plant could be Berula erecta or possibly Sium suave, neither of which could be located in the Clarkdale vicinity during the field work period.

This medicine would still be used if it were available. The dried root slices are boiled into a tea which is taken "for everything."

Apache name: /ma' cho izee/.

Not available: This plant, which was described as being about six inches tall with a yellow flower and a long single root, used to grow in the Clarkdale area but has not been seen in years.

The tap root was used in healing broken bones. A piece of the root was cut off, chewed, and then "blown" on the broken bone. Injuries treated in this manner are said to have healed quickly with little or no other treatment.

Apache name: /izee hajinii/.

Not available: A sample was obtained of a crushed, dried plant material, stems and leaves, which is used as a medicinal tea. The plant, said to grow on Mingus Mountain, is definitely a member of the mint family (Labiatae) and could be either Monarda pectinata or Salvia reflexa.

A tea is prepared from the plant material in the usual manner. It is good for coughs and for upset stomachs. It has also been used with some success as a soothing lotion for an infectious rash.

Apache name: /it'ą ch'oz/.

Not available: This plant is also a member of the mint family; further identification on the basis of the sample obtained is impossible.

The stems and leaves are boiled into a tea which can be taken "for everything." It is said to be particularly helpful for a person who is feeling sick to his stomach and has not been eating.

Apache name: /izee ɬbahe/. /ɬbahe/ means greyish or brownish in color.

Not available: The most distinctive thing about this medicinal root is its pungent odor of burnt sugar. Unfortunately the entire plant could not

be obtained so that it is at present impossible to identify it beyond the fact that it is probably a member of the Umbelliferae.

Long ago people would chew or soak this root and rub it on sores or swellings to heal them and relieve the pain. This root was also reportedly used many years ago as a medicinal steam in a curing ceremony held for a woman suffering from tuberculosis.

Apache name: /haiits'ide/.

Not available: This plant could not be identified satisfactorily since only the root was available. It may be a member of the Rosaceae. The long red tap root is chopped and boiled for a tea which is taken to relieve an upset stomach. It is also a tonic ingredient.

Apache name: /izee lichi'ii/.

ARTS, CRAFTS AND DOMESTIC ITEMS

This section will discuss those plants utilized in basketry, cradleboard construction, dyeing, dwelling construction, and also those plants used for firewood and soap. Only two tools made from plants were mentioned. Both are used in food preparation and have already been discussed: a brush used in cleaning Opuntia spp. (see p. 20) and a digging stick used in collecting Agave spp. (see p. 49).

Basketry

Only four Apache women in the field work area make baskets. These baskets are made for sale and not for household use. Two of the women

the women have only recently begun to make baskets again after a long hiatus. They used to make baskets for sale when they were young women, but the prices they could get for their work were so low that they were forced to give up the craft. Sometimes they would be offered only two to four dollars for what amounted to several weeks work. Today collectors will offer fair prices and the craft has become worthwhile again. The craftsmanship of all four women is generally excellent. Unfortunately the future of basketry in this area is much in doubt, for very few young women have shown interest in learning this exacting task.

Only two general types of baskets are made today. All of the women produce baskets done in close coiled work. The shapes of the coiled baskets vary; the shallow bowl is the most common shape, but ollas and deep ovals are also being made. The other type of basket is made by only two women. This is the traditional /tus/, or pitched water jar, which is done in twined work. One other woman occasionally tries her hand at twining but generally prefers the close coil technique. The description of basketry methods and techniques given in this paper will be kept as brief as possible. The reader interested in learning more about the craft of basketry among the Apache is referred to Roberts' Basketry of the San Carlos Apache. The information on the gathering and preparation of materials and methods of weaving contained in this monograph is quite detailed and the practices of the Apache in the field work area show only minor differences. The Roberts' monograph also presents adequate comparative materials, and it seems unnecessary to

repeat them here except to add that the Yavapai produce coiled basketry similar in material, technique and design.

Several different plants are utilized in close coiled work. The coiled baskets all have a three rod foundation. Long straight twigs of desert willow (Chilopsis linearis), cottonwood (Populus fremontii), "redberry bush" (Rhus trilobata) or willow (Salix spp.) can be used as rods. Reportedly "any kind of willow will do" but Salix gooddingii, by far the most common species of willow in the area, was the only willow actually observed in use. A single, large Salix laevigata was pointed out one day while on an excursion to collect basketry materials; this species would be used for rods if it were more readily available. One rod of desert willow (to provide stiffness) and two of "any other kind of willow" (to provide flexibility) seems to be a preferred combination, but an all willow combination is also common.

Three plants can provide white sewing splints: mulberry (Morus microphylla), cottonwood (Populus fremontii), and "redberry bush" (Rhus trilobata). Of these three the first two are the most popular. Black sewing splints for designs are obtained from the split dried fruit of Proboscidea parviflora and red sewing splints from the inner bark of the root of the broad-leaf yucca.

Basketry materials are collected at various times of the year. For the majority of the plants fall is considered the best time of the year for gathering. Devil's claw (Proboscidea parviflora) is not ready

until October. Broad-leaf yucca root is never dug in the summer but in the fall or early winter. The inner bark is redder at this time and it is also considerably cooler to dig. The slender roots must be dug carefully in order to obtain the longest sections possible. Mulberry and Rhus trilobata twigs are also best collected in the fall. In the spring they are too sappy. Cottonwood twigs may be gathered in the spring or summer. Occasionally, when the bark is stripped off they are found to be greenish in color at this time, in which case it is considered better to wait till early fall. If it is absolutely necessary, cottonwood can be collected in the winter; but at this time of year the bark, which slips off easily when the tree is in leaf, is difficult to remove. This can be remedied by boiling the twigs before stripping the bark, but the result will be splints not as white as those collected at the proper time. Willow and desert willow may be gathered at any time of year.

Twigs used for rods and sewing splints must be long, straight, smooth, and slender; those used for rods may be somewhat thicker than those selected to provide sewing splints. In practice this usually means that the twigs must come from young trees. This is particularly true for cottonwood. Cottonwood trees of about six to ten feet in height generally provide the greatest number and the best quality of twigs for sewing splints. Mulberry and Rhus trilobata are shrubs. They are often pruned to the ground in order to produce long straight shoots the next year.

All twigs used for basketry must be stripped of leaves and bark as soon as possible after collection. If the task is left for more

than a few hours the twigs dry and the bark becomes impossible to cleanly remove. Twigs for rods are now ready for use, although some may need paring down before insertion into the basket foundation. Twigs for sewing splints may be split while fresh or they may be left to dry. Later they can be soaked briefly in water and then split. These twigs may be split into either two or three pieces. The proper number of notches is made with a knife at the cut end of the twig. The notch is then held with the teeth while the basket maker guides the splitting process down the twig with her thumbs and forefingers. Further paring and smoothing of the sewing splints is usually left until just before they are used in construction.

Basketry materials may be stored for very long periods of time with no ill effects. One woman has some cottonwood and devil's claw splints which she prepared and put away in 1935.

The twined water jars are constructed entirely of Rhus trilobata. The twigs for rods and twining elements are collected and prepared in exactly the same way as those used in coiled basketry. The jars are made in the shape of a small olla.

After the jar has been woven, plant material of some kind is pounded up and rubbed into the interstices. The two women currently making water jars use yucca leaves for this purpose. Another woman recalls that her mother used manzanita leaves (Arctostaphlyos pungens) while still another woman remembers that her mother and grandmother preferred to use cedar leaves (Juniperus spp.). (It should be noted

that this last family made coiled rather than twined water jars; otherwise their technique was identical to the general one described here.) The water jar is now left in the sun to dry for a short while.

When it is available a certain red rock is ground to a powder which is rubbed over the outside of the /tus/ at this point. From its description this mineral is probably hematite. Rubbing the water jar with this powder will give the finished product a lovely reddish coloration of varying intensity.

The final step in making a /tus/ is to coat the jar with melted pinon pitch (Pinus edulis). The inside is pitched first by placing clean pitch into the jar and then twirling it around rapidly over a heat source to melt the pitch and distribute it evenly. Next the outside of the jar is varnished with melted pitch. The whole pitching procedure requires rapid, deft movements and a sure knowledge of what one is doing if the /tus/ is to turn out properly. The procedure is also somewhat dangerous since the pitch, if overheated, could catch fire and burn one severely.

After the pitch is applied, it is left to cool and harden. The watertight /tus/ is now completed and ready for use, or for sale.

The following is a list of plants employed today in basketry together with their Apache names.

Arctostaphylos pungens (manzanita, point leaf manzanita)

Apache name: /noosh/.

Chilopsis linearis (desert willow)

Apache name: /ch'il ilqǫhe/.

Morus microphylla (mulberry)

Apache name: /its'in/.

Pinus edulis (pinon)

Apache name: /obe' chin/. The term for pitch is /jee/.

Populus fremontii (cottonwood)

Apache name: /t'is/.

Proboscidea parviflora (devil's claw, unicorn plant)

Apache name: /ehugoséhe/.

Rhus trilobata (skunkbush, squawbush)

Apache name: /nk'oze/.

Salix gooddingii (Goodding willow)

Apache name: /gaazcho/.

Salix laevigata (red willow)

Apache name: /k'ai ɬba/. This term translates to "grey willow." The tree is so named because the undersurfaces of the leaves are grey in color.

Yucca spp. (broad-leaf yucca)

Apache name: /iigaaye/.

Cradleboards

The cradleboard provides a safe and convenient way of carrying a baby while still leaving the hands free for other tasks. Only one woman was observed to be making a cradleboard (for a gift), but the technique seems generally known.

The cradleboard consists of three basic parts: an oval frame;

a hood or shade for the baby's head attached to that frame; and straps to hold the baby in place and to attach the cradleboard to the mother's back.

Mesquite root (Prosopis juliflora) is traditionally used for the frame. The sturdy root must first be soaked in water to make it flexible enough to bend into the proper oval shape. The overlapping ends are tied together and the frame is left to dry. If mesquite root is not available a stout, smooth, green willow branch may be used instead. The dried stalk or inflorescence of Agave spp. or of Dasylirion wheeleri may be split and cut into slats or crossbars for the frame. Wooden crates or boxes usually provide material for this purpose today. These slats are attached crosswise for the full length of the frame and they supply support for the baby's back.

The hood or shade is made of desert willow twigs. Ordinary willow (Salix spp.) may be substituted. The twigs are stripped of leaves and bark and then soaked and bent into a ⌒ shape. The bent twigs are placed against each other and sewn together with stout sewing or crocheting thread at intervals of about three inches until the shade reaches the desired breadth. All of the outward edges are carefully bound with a border of white cloth which is neatly hemmed in place. The entire shade is usually dyed. The woman currently making a cradleboard said that she thought she would dye the shade yellow and that she might use the roots of the barberry (Berberis haematocarpa) for that purpose. After dyeing the shade is attached to the frame.

Finally the straps are sewn onto the frame. The straps, formerly made of deerskin, are today made of strips of white cloth which may also be dyed.

In the old days the shredded bark of the cliff rose (Cowania mexicana) was used to pad the cradleboard and provide a comfortable mattress for the baby. The bark also served as a convenient, disposable diaper, for when it was dirtied it could be thrown away and replaced with fresh material. Cloth is now used for padding.

The plants used in cradleboard construction are listed below, together with their Apache names.

Agave spp. (century plant, mescal)

Apache name: /nada/.

Chilopsis linearis (desert willow)

Apache name: /ch'il ilkǫhe/.

Cowania mexicana (cliff rose, quinine bush)

Apache name: /me' chaal/. /me'/ is the word for baby.

Dasylirion wheeleri (sotol)

Apache name: /ekibaane/.

Prosopis juliflora (mesquite, honey mesquite)

Apache name: /ii yaa/.

Salix spp. (willow)

Apache name: /gaazcho/. This is the term for S. gooddingii, the most common species of willow in the area and therefore the one probably most frequently used locally in cradleboard construction.

Dyes

Six plants were mentioned as being used as dyes. The use of walnuts (Juglans major) and mesquite pitch (Prosopis juliflora), as combination hair dyes and dandruff remedies has already been discussed (p. 87; p. 94).

Hides, such as deerskin, were once dyed with plant materials. Sycamore bark (Platanus wrightii) and canaigre root (Rumex hymenosepalus) are said to have produced a reddish color. The technique employed was to crush or chop the plant material and then soak it in water with the hide.

Basketry splints can be dyed with vegetal dyes if desired. Canaigre roots should produce a reddish color, while barberry roots (Berberis haematocarpa) yield a yellow hue. The possible use of barberry as a cradleboard dye has already been mentioned (p. 108). The technique used here is to boil the plant material with the objects to be dyed.

One friend recently tried to dye some basketry splints with alder bark (Alnus oblongifolia). She learned about this dye from a Navajo lady, who told her that the resulting color should be orange. My friend's experiment was a failure and her splints came out a pale, dirty brown. She attributes the failure to the fact that she tried to dye too many splints with too little bark. She laughed and said she might try again sometime.

The only other women who have recently been engaged in dyeing basketry splints are using crepe paper rather than vegetal dyes.

The following plants are or were used as dyes:

Alnus oblongifolia (alder)

Apache name: /k'is/.

Berberis haematocarpa (barberry, holly-grape, red mahonia)

Apache name: /dawali/.

Juglans major (walnut, Arizona walnut)

Apache name: /ch'iɬ niyé/.

Platanus wrightii (Arizona sycamore)

Apache name: /gaastlae/.

Prosopis juliflora (mesquite, honey mesquite)

Apache name: /ii yáá/.

Rumex hymenosepalus (canaigre, wild rhubarb)

Apache name: /jiɬ dozhe/.

Dwelling Construction

The construction of the traditional Apache brush house has been described often enough in published literature to justify dispensing with any detailed account here. Baldwin, for example, offers a concise but clear description, complete with photographs (1965:69-71).

Brush houses are no longer built in the Clarkdale area. There is at least one such house at Middle Verde; it is said to be used by its owner for the occasional brewing of tulipai.

The following plants are said to have been employed in the old days in dwelling construction:

Baccharis glutinosa (seep willow, water willow): This tall, sticky

leaved shrub is common along watercourses all over Arizona below 5,500 feet. The leafy branches were used to thatch the roof and walls of the dwelling.

Apache name: /tɬeɬ/.

Nolina microcarpa (beargrass, sacahuista): This plant, which bears a superficial resemblance to yucca, is found nearly throughout the State, usually on rocky slopes between 3,000 and 6,500 feet.

The leaves were used as a roof covering because of their ability to shed water. Canvas later replaced the beargrass as waterproofing.

Apache name: /gogisa/. The name translates loosely to "sharp, like the edge of a knife" and refers to the sharpness of the leaf margins.

Salix spp. (willow): Long, slender willow branches were cut and bent into a dome shape. Several such branches tied together served as the framework of the house.

Apache name: As noted earlier, the terms for willow vary. /gaazcho/ is the name for S. gooddingii, and /k'ai ɬba/ is the term for S. laevigata.

Yucca spp. (yucca): The leaves of any type of yucca were pounded and then used to tie the willow framework together.

Apache name: /iigaaye/ (broad-leaf yucca); /iigaaye chosé/ (narrow-leaf yucca).

Firewood

Since many people in this area rely on a wood burning range as

both a cookstove and a heat source, a regular supply of firewood is essential.

The following is an undoubtedly incomplete list of woody plants used for firewood:

Acacia spp.: The wood of these plants is deemed a good cooking fuel since it burns quite hot.

Apache name: /ch'il gojiza/.

Juniperus spp. (cedar, juniper)

Apache name: The name varies; see p. 89.

Pinus spp. (pine) The pitch or /jee/ in this wood will start a fire even if the wood is wet.

Apache name: The term varies. See P. edulis (p. 38); and P. ponderosa (p. 65).

Prosopis juliflora (mesquite, honey mesquite)

Apache name: /ii yáá//.

Quercus spp. (oak): The "hard oaks" are valued for their long burning periods. A large piece of oak will burn slowly all night long. This is said to have been particularly advantageous in the old days, prior to the introduction of matches, when starting a fire was a tedious chore.

Apache name: The term varies. See Q. gambelii (p. 119); Q. palmeri (p. 44); and Q. turbinella (p. 119).

Soap

Two plants were mentioned as a source of soap:

Atriplex canescens (four-wing saltbush, chamiso): This shrub can

adapt itself to very diverse areas and conditions. It has been found in association with creosote, sagebrush, pinon, and even ponderosa pine.

The blossoms were once mixed with water and used as a shampoo and body soap. A large quantity of flowers was needed to make a good lather. The soap has not been used in many years.

Apache name: The name could not be remembered.

Yucca spp. (yucca): The chopped or shredded root of any species of Yucca can be used as soap. It is said to make a good shampoo, but it has not been used as a personal soap for a long time. However, yucca root is still considered the best soap for washing baskets.

Apache name: /iigaaye/ (broad-leaf yucca); /iigaaye chose/ (narrow-leaf yucca).

MISCELLANEOUS

This last data chapter is reserved for those groups of plants which do not seem to fall under any of the preceding categories. To be discussed here are wild plants which are cultivated in some way, plants which are named but for which no use is known, and plants recognized but not named.

Cultivated Wild Plants

Not all of the plants listed below are cultivated in the ordinary sense of the word, i.e., deliberately planted as seed or seedling and

thereafter cared for. The watering or weeding of wild plants, or the alteration of a wild plant in any manner so as to make that plant more suitable for human uses may also be considered as cultivation. It is this broader sense of the term which is intended here.

Arundo donax (giant reed): This tall bamboo-like perennial is planted by many Apache families near their homes for shade.

It is said that the stems of these plants were once used as arrow shafts. This is probably an error. For one thing A. donax is an introduced species from the Old World and has probably not been plentiful in this state for a very long period of time. More important is the fact that the A. donax reeds (at least in the field work area) do not seem suitable for use as arrow shafts. Where the reed is slender enough it is far too flexible to serve this purpose; and where it is sturdy enough the diameter is much too large. It is probably Phragmites communis which was used for the arrow shafts. This is a much more suitable plant and is known to have been used for that purpose by other tribes in the Southwest and Mexico. P. communis was also undoubtedly readily available for use at the time when arrows were still being made. There is no mystery as to how the Apaches could confuse these two plants or even why they might give them the same name. The plants closely resemble one another and even a botanist sometimes has difficulties in positively identifying a given specimen.

It is not known just how long the Apaches have been cultivating A. donax, but it is certain that it is not a recent thing. If the

habit is indeed a very old one, then it is interesting to speculate that the Apaches may once have cultivated P. communis as well.

Apache name: /tɬo k'a/. The old use of the plant is aptly indicated by the modern translation of the term: "grass bullet."

Morus microphylla (mulberry): The mulberry shrub is pruned in the fall so that it will produce long, straight shoots for basketry the following year. Young cottonwood and willow trees and Rhus trilobata shrubs are occasionally treated in the same manner for the same purpose.

Apache name: /its'in/.

Parthenocissus inserta (Virginia creeper): This attractive vine, similar in appearance to the often cultivated Virginia creeper (P. quinquefolia) of the eastern United States, is common throughout the State between the elevations of 3,000 and 7,000 feet. It is said to be fairly abundant in Oak Creek Canyon.

One woman obtained a cutting of this plant from a white friend and planted it outside her house as an ornamental. The vine, now almost twenty years old, has grown to a considerable size and provides some shade.

Apache name: /gejesjíns/.

Populus fremontii (cottonwood): Cottonwood trees are sometimes trimmed in the same manner as mulberry shrubs (see above). Young cottonwood trees, a valued source of basketry materials, are becoming more and more scarce in the immediate Clarkdale vicinity. While this seems to be an atypical procedure, one friend has planted her

own cottonwood tree, obtained as a gift, as a partial solution to the shortage. It will also serve as a shade tree.

Apache name: /t'is/.

Proboscidea parviflora (devil's claw, unicorn plant): The fruit of the devil's claw plant can be and is collected in its wild state. However, the Pima have been cultivating the devil's claw for years and have developed a strain with white seeds and, more important for basket makers, extremely long claws. One Apache woman managed to obtain some of these seeds and has planted them in the garden of a friend at Middle Verde. The first crop is expected to be ready for harvest in October of this year.

Apache name: /chugoséhe/.

Rhus trilobata (skunkbush, squawbush): See Morus microphylla, p. 116.

Apache name: /nk'oze/.

Salix spp. (willow): See Morus microphylla, p. 116.

Apache name: /qaazcho/ (S. gooddingii); /k'ai łba/ (S. laevigata)

Vitis arizonica (canyon grape, wild grape): It is said that a man once dug up some of this vine and planted it outside his house for shade. The transplanting of wild plants is probably not too rare. One woman is currently thinking of moving some hedgehog cactus (Echinocereus engelmannii) to her yard so that she can more readily enjoy its beautiful pink flowers in the springtime.

Apache name: /ta ch'aa/.

Plants Not Used

The following is a list of plants which are named but which were stated to have no past or present use. It is recognized, of course,

that some of these plants provide food for animals and that fact is occasionally reflected in the name of the plant.

Baccharis wrightii: This plant and Gutierrezia sarothrae are classed together under the same Apache name, /dil zasi/. Although one woman reported that she had once, years ago, used /dil zasi/ for bedding, it seemed to be generally felt that these plants have no use. Therefore, they have been listed here rather than under domestic items.

Apache name: /dil zasi/.

Caesalpinia gilliesii (bird of paradise flower)

Apache name: /ch'il gojiza/.

Calochortus nutallii (sego lily, star tulip): There is a saying that if you eat the bulb of this beautiful wild flower you will get dandruff. This plant is seen as similar to the wild onion and is given a similar name.

Apache name: /jiɬ chį́ intl'ézee/.

Croton texensis (dove weed)

Apache name: /hawoo bichosohe/. /hawoo/ is the name of the dove and the whole term is translated variously as "dove's shadow" or "dove's umbrella."

Gutierrezia sarothrae (snakeweed, matchweed, broomweed)

Apache name: /dil zasi/.

Hordeum jubatum (foxtail barley)

Apache name: /tɬo niwuzhee/.

Hymenoclea sp. (burro brush)

Apache name: /tɬeɬ/.

Mimosa biuncifera (wait-a-minute, catclaw)

Apache name: /ch'il gojiza/.

Opuntia leptocaulus (Christmas cactus)

Apache name: /hiąąz/.

Populus tremuloides (aspen, quaking aspen)

Apache name: /shitáko t'is/ or /t'is jiɬ godilinii/ which may be shortened to /jiɬ t'is/. Both names can be very loosely translated as "mountain cottonwood."

Quercus gambelii (Gambel oak)

Apache name: /chi chil cho/.

Quercus turbinella (shrub live oak, scrub oak)

Apache name: /chil/.

Rhamnus californica (California buckthorn, coffee-berry)

Apache name: /bida są/.

Rhamnus crocea (red-berry buckthorn)

Apache name: /bį it'ą/.

Not available: This plant is referred to in English as "tumbleweed."

Apache name: /na gizé/. The term means "rolling around."

Not available: This was described as a low plant with little white flowers.

Apache name: /k'es binaa/. The term was translated as "snake eyes."

Not available: A cactus of some kind, this plant was described as large and similar to the saguaro but with no branches. It is

also said to grow with the saguaro. If this is true, the plant may be one of the barrel cacti (Ferocactus sp.).

Apache name: /hosh chaaɬ/. /chaaɬ/ is the term for the basketry awl. Perhaps the spines of this cactus were seen as similar to the awl, or (and this is pure speculation) they may once have been used as awls.

Not available: "Morning Glory" is the English term for this plant, but my friends were careful to point out that this is not the plant usually given that name. It was described as a low plant with grey-green leaves and light pink flowers that bloom in the morning.

Apache name: Variously given as /dabigoɢaha/ and /dabi higáhel/.

Plants Not Named

Two plants were recognized but were said to have no known Apache name:

Argemone intermedia (prickle poppy)

Castilleja integra (paintbrush, painted cup)

CONCLUSION

It will be remembered that the first and primary objective of this paper was to record the ethnobotanical information still extant among the Clarkdale Apache. Within certain limits, this goal has been accomplished. This paper does not pretend to be a complete ethnobotanical report, but it does contain information on almost every plant that is well known by and important to these people.

A few remarks and observations seem in order at this point. Not all of the information in this paper is known to all of the people in the Clarkdale area. The reasons for this are varied. Some of the information is relatively specialized as, for example, that related to basketry. There are not many basket makers in the area today. For one person to have an exhaustive knowledge of all plants in a particular category, such as medicine, would be seen by the people themselves as improbable, if at all possible. This point has already been discussed. More important, however, is the fact that few people today actively collect and use wild plants. There is no apparent revival of interest in native foods in this area as there is said to be at San Carlos. When a plant has been described in this paper as "widely collected" it must be remembered that this description is a relative one. The plant may be "widely collected," but only in comparison to other plants still gathered. And, today, wild plants are not collected in very large quantities or by a very large number of people.

Furthermore, in regard to food, the number of kinds of plants collected has declined over the years. As one woman put it, "We used to eat all wild things and some meat. We eat very few of those things now." Many of the plants listed in this paper as "no longer in use" were gathered, some of them on a regular basis, by older people's parents or grandparents. Today only the following are ever eaten with any degree of regularity: Rhus trilobata berries, acorns, "Indian spinach," broad-leaf yucca fruit, cactus fruit, pinon, walnuts, and occasionally, mesquite beans. Again, none of these foods can be said to figure prominently in the local diet.

The second objective of this paper was to make some statement about Western Apache exploitation of environment and about that exploitation in comparison with other groups in the Southwest. This objective, historical in nature, has been met with only a limited degree of success.

Generally speaking, the agreement of the Clarkdale data with other Western Apache sources is very good. Information about the aboriginal collection cycle, for example, is inherent in the Clarkdale data, and it does not conflict with the picture painted by other observers, such as Goodwin (1942:155-59). Goodwin's assessment of pre-reservation staples is also generally supported by the Clarkdale data. According to him, "Certain plants were staples: mescal, saguaro fruit, acorns, mesquite beans, fruit of Spanish bayonet [broad-leaf yucca], sunflower seeds, fruit of prickly pear, piñon nuts, and juniper berries. Of these nine, mescal and acorns were the

most important" (1935:62). Again, there is nothing in this paper which would suggest any radical departure from the general outline of Western Apache exploitation of wild foods as it is known today.

However, the data presented in this paper do raise some questions on smaller details. Some of these points may be seen as relatively minor. For example, the reader will recall several conflicting reports as to which or how many species of a particular plant were utilized. There are several cogent explanations for this apparent mix-up. There could be errors in scientific identification of the plants involved. Apache folk taxonomy may not have been taken into account in some reports, leading us to believe that a plethora of species was involved when in actuality there may have been only one or two, or vice-versa. More important is the fact that the large territory historically occupied by the Western Apache was topographically quite diverse. It ranged from desert valleys to high mountains, and the flora was varied. Therefore, it should not be surprising that a variety of species may have been employed; nor should it be surprising that one Western Apache group or band might express a preference for one or another species out of several potentially available, while another group or band might opt for a different species. If desired, a partial solution to this question could be effected by a comparison of known group or band ranges with a botanical distributional study. Another potential source of disagreement is the occasional conflict in reports on methods of collection and preparation. Of course, there is the possibility that erroneous information has been obtained by

one or more investigators. More probably this was an area where individual or group preference held some sway, since no reported technique is blatantly inefficient. Both of these questions are relatively minor ones, but they do point out the need for caution in naming the use of one particular species or technique for the Western Apache as a whole.

Two other points or questions emerge from a seeming lack of data rather than from conflicting reports. Only one root food, the wild onion, was mentioned by the Clarkdale Apache. The comparative evidence gathered indicates that this was a fairly common Western Apache food. The only other root food specifically mentioned with any frequency in the literature is the wild potato [Solanum sp.] (e.g. Reagan 1929:160). The relative dearth of references to roots as food is all the more remarkable when the relative emphasis on roots as medicines is taken into consideration (for example, more than 50% of the medicinal plants described by the Clarkdale Apache are or were collected for their roots). Now Bourke, an early observer, recorded the Apache as having "down to our day" eaten "tule" and "wild hyacinth bulbs" (1892:520). But Hrdlička, less than two decades later, commented that "Regarding roots and bulbs the San Carlos people know but little" (1908:258). Apparently, if the Western Apache ever made extensive use of roots for food, that practice disappeared very early in their recorded history.

Another food source that seems to have disappeared at an early date is seeds. (Pinons are excluded from the following discussion.

They are technically seeds but are commonly thought of as nuts.) Goodwin, as quoted above, referred only to sunflower seeds as a staple, but it seems likely that other seeds were also important. Bourke (1891:131) remarked that, in addition to the sunflower, "several varieties of seed bearing grasses [were] of importance to the Apache" before the turn of the century. Turning to later publications, Reagan's ethnobotanical list (1929:155-61) includes several species of seed bearing plants which provided food. However, according to his commentary, the majority of these seeds were no longer in use at the time of his study. The Goodwin manuscript occasionally refers to the use of seeds for food, but the past tense is usually employed (n.d.:25;90;101). Buskirk's 1949 dissertation states that, although "many" kinds of seeds "were formerly eaten," they have "apparently not been gathered during the last ten years and are now known only to the older people" (336). Four different seed bearing plants were remembered by the Clarkdale Apache, but again, no seeds have been collected for many, many years. One older woman remarked that her grandmother collected several different kinds of seeds and that some of these plants have now disappeared. She suggested prolonged dry weather as a reason for this disappearance; another factor might be competition with introduced plants. In summary, wild seeds were probably one of the first native foods to be supplanted by a white man's product--in this case, flour, which is certainly easier to obtain and prepare. In any case, seeds are now, for the most part, only a memory.

It will be noted that remarks about Western Apache exploitation of environment have been confined to wild foods, although comparative information was provided in this paper for both food and medicine. The available data on medicinal plants are all incomplete and appear conflicting at times. All that can be safely said at this point is that most of the plant medicines (or at least related species) described by the Clarkdale Apache have been recorded as being used by other Western Apache, but not always for the same purpose. What emerges from the accumulated evidence is that the Western Apache, particularly in the past, have made extensive use of their natural environment for both food and medicine.

Great caution is needed when attempting to compare Western Apache exploitation of environment with that of other groups in the Southwest on the basis of information contained in or referred to by this paper. For one thing, the comparative information given here does not pretend to be an exhaustive survey, as explained in the introduction. Only the following generalizations can be made. Few foods utilized by the Western Apache have not been reported as being collected by at least one other southwestern group. Furthermore, the Western Apache staples all appear to have been widely collected throughout the Southwest. Sunflower seeds are a possible exception to this statement, but the relative lack of references to this food may be due to gaps in our knowledge rather than to any widespread neglect of the plant. Of course, the extent of dependence on any one of these foods undoubtedly varied from group to group (the extent of

dependence on a particular food by a particular group is not always known). One factor influencing dependence would be agricultural development. Another would be the accessibility and abundance of the individual food plants. Here sound distributional studies, such as the one done by Castetter, Bell and Grove (1938:1-92) on Agave, would be useful. In regard to medicine, a distributional study might also be of some use in making statements about comparative exploitation, but medicine is a complex subject. Much more data would be needed on the exact species used and their medicinal applications than now appear to be readily at hand. Cultural differences, such as conceptions of health and illness or differences between ceremonial and common remedies, if any, would also have to be taken into account.

The last objective of this paper, to make some statement about the nutritional and pharmacological adequacy of plants utilized for food and drugs in the past and present, could not be completely fulfilled. However, what comments can be made are, for the most part, all positive.

Nutritional analyses of eighteen of the wild foods, including the nine Western Apache aboriginal staples, were located. Unfortunately the majority of these analyses are really incomplete, thus restricting one's ability to judge the nutritional adequacy of the foods; this is particularly true of the two most important staples, mescal and acorns. The reasons for the inadequacy of the analyses are several. Occasionally the plant species analyzed is not identified or, if it is, it may be one whose relationship to the local species

is unknown. Plant species and even varieties can vary in composition. Therefore, caution must be exercised in drawing conclusions about one species based upon an analysis of another. This factor, for example, limits the usefulness of the analyses of acorns presented in this paper. Many of the analyses, if not all, do not take into account native preparation and cooking techniques or, if they do, do not state them clearly. Such is the case with Ross' analyses of mescal (1944:40-44). Mescal, like several other Indian foods, required special preparation which undoubtedly changed (and probably enhanced) its nutritional value. Finally, a large number of the analyses located are now many years old. The facilities and techniques for thoroughly determining the composition of a food, from amino acids to vitamin and mineral contents, simply were not available to these early investigators. This means that their analyses are, by today's standards, incomplete and thereby possibly misleading.

In spite of these difficulties, the overall impression gained from a review of the nutritional analyses presented in this paper is generally encouraging. Where a food appears to be of dubious value, such as yucca fruit or juniper berries, one can honestly say that the analyses are incomplete. Where the analyses are complete, as with some of the greens and pinon nuts, they are very favorable.

There are many difficulties involved when one turns from analyses of individual foods to an assessment of the total diet. The primary limiting factor here is lack of knowledge. Our picture of

pre-reservation Western Apache diet is basically a generalized one. Buskirk gives what is probably the most detailed account of Apache diet composition, including an estimate of which foods were eaten at various seasons of the year (1949:380-81) and some indications as to which staples were most preferred and economically important (354-55). Perhaps a nutritionist could combine Buskirk's report with other data and some modern nutritional analyses and produce an assessment of Western Apache diet. But the quantitative data needed for a truly adequate assessment, data that would indicate how much of a food was eaten, how dependent a group or groups were on a particular food or foods, are lacking. However, the following comments and speculations may be of interest.

Goodwin (1935:61-62) estimates that meat formed about 35-40% of the Western Apache diet, wild plant foods 35-40%, and domestic plant foods 20-25%. Buskirk's (1949:279;354) estimates are close to those of Goodwin. Both authors point out that these percentages could and did fluctuate somewhat from season to season or from group to group. Venison was the most important meat quantitatively, followed in order of importance by other large game (antelope, elk, mountain sheep, bear), small game, and animals taken in raids (burros, horses, cattle) (Buskirk 1949:280). Principal domestic crops were corn, pumpkins, beans and wheat. Corn and pumpkins were the oldest crops, and corn was the only crop "of major importance" (Buskirk 1949: 425).

If this information is correct, then the pre-reservation Western Apache diet may be seen as roughly equivalent to what is considered

a normal, healthy diet today, at least in terms of protein and carbohydrates. The diet appears to have been low in fat generally and high in polyunsaturated fats, since the meats eaten probably were low in fat (100 grams of raw venison contains only four grams of fat; a comparable portion of choice rump roast conatins 25.3 grams of fat [Watt and Merrill 1963:65;15]), while seeds and nuts are high in polyunsaturated fats. A low fat diet with an emphasis on polyunsaturated fats is considered by nutritionists today to be a good one.

The ratio of calcium to phosphorous in some of the native foods, such as sunflower seed meal, is unbalanced. This imbalance unfavorably affects the body's absorption of the available calcium. However, a diet high in polyunsaturated fats, as is probable in the case of the Western Apache, favorably affects calcium absorption and so could help counter the effect of the calcium-phosphate imbalance. Also, vitamin D intake from the sun probably increased calcium absorption.

If greens were a stable part of the diet, then the vitamin A intake could be seen as adequate. Vitamin C intake appears to have been adequate and was probably obtained primarily from greens, berries and other fruits such as the prickly pear. The diet may have been reduced or inadequate in vitamin C during the winter when fresh vegetal foods were unavailable. Storage by drying destroys half or more of a food's vitamin C content.

The iron intake appears low, but it is impossible to be sure

on the basis of present data. However, it is known that the red blood cell count of people living at a high altitude increases, and as this occurs the need for iron is apparently decreased. Many of the Western Apache lived a considerable portion of their lives at higher altitudes.

Finally, it was hoped that some statement could be made about the possible nutritional contribution of native foods to the modern Western Apache diet. This task has proved even more difficult than an attempted assessment of the pre-reservation diet. The major problem is the same: inadequate knowledge of the actual composition of diet. Buskirk, writing in the 1940's, referred to beef and wheat flour tortillas as the chief items of the modern diet (1949:374). A more recent article by Miller (1970:205) described beans, tortillas and fried bread as the most important items in terms of quantity. Miller commented that "The dietary pattern is essentially a shift toward more starches and carbohydrates more often and not toward more animal proteins. There is greater caloric intake . . ." (1970:205). The modern shift in diet is probably due as much if not more to financial restrictions as it is to any changes in food preference or availability. However, to return to the main point, wild foods are no longer staples; and, for the few people in the Clarkdale area who still collect and prepare them, these foods form an incidental rather than an important part of the diet. All that can be said is that, when these foods are consumed, they probably form a good, temporary source of some needed nutrients.

Pertinent pharmacological data were located for a little more than half of the identified drug plants. Some of the same problems encountered in utilizing the nutritional analyses also apply to the pharmacological ones. For example, the species analyzed is not always the same as the native drug plant. However, most of the analyzed species are related to the native plant in question and occasionally this relationship is very close (for example, Eriodictyon californicum and E. angustifolia). While realizing the limitations of the available evidence, it is still felt that the following general statement can safely be made: All but one (Sambucus neomexicana) of the Clarkdale remedies for which analyses could be located appear to be at least partially effective for their stated purpose, and some of them--such as Datura meteloides and Eriodictyon angustifolia--appear to be very good indeed. Now, the reader will have noted that the Clarkdale stated purpose for a particular medicine does not always agree with the stated purpose cited by other Western Apache or southwestern sources. This does not necessarily mean that the Clarkdale usage is correct while the other usages are ineffective. Efforts were concentrated here on researching the effectiveness of a remedy for its stated Clarkdale purpose because it was felt that this was a proper approach for such a short paper. But it should be remembered that many of these medicinal plants were found to contain constituents with broad medical applications. Astringents, for example, have been used

to treat a wide range of human ailments. A particular plant remedy could conceivably be used for more than one purpose with positive results.

In closing, it is hoped that what few comments could be made here about Western Apache exploitation of environment and about the nutritional and pharmacological value of certain plants will be of interest or use to many readers. It is especially hoped that the data contained in this paper will add to our still incomplete knowledge of Western Apache ethnobotany.

APPENDIX I.: FOOD COMPOSITION TABLES

Table 1. Ross: Mescal, saguaro fruit, saguaro seed, mesquite beans, prickly pear and yucca fruit.

Table 2. Turner: Walnuts, acorns, amaranth seed, sunflower seed and meal, prickly pear and amaranth greens.

Table 3. Watt and Merrill: Amaranth greens, lambsquarters, pinons, prickly pear, sunflower seed and meal, and black walnuts.

Table 4. Yanovsky and Kingsbury: Juniper berries, pinons, wild onion, broad-leaf yucca fruit, hackberry, barberry, mesquite beans and pods and manzanita berries.

FOOD COMPOSITION TABLE 1

Plant		Source	Protein	Fat	Carbo-hydrate	Calories*	Ash	Calcium
			%	%	%		%	%
Mescal pulp, stalk of the century plant (Agave parryi)	Sample 1	Sells	1.03	1.11	82	341	4.90	1.448
	2	Catalina Mts.	4.67	1.08	81	348	7.09	2.210
	3	"	5.99	0.98	81	353	16.05	3.620
	Av.		4.56	1.06	81	347	8.16	2.426
Saguaro fruit, fruit of the giant cactus (Cereus giganteus)	1	Santa Rosa	9.77	22.07	64	535	3.48	0.034
	2	Sells	10.38	11.08	74	473	3.72	0.033
	3	Sells	10.70	11.77	74	484	2.60	0.028
	Av.		10.28	14.97	70	499	3.27	0.032
Greene's Analysis			13.06	9.93			6.91	
Saguaro seed, seed of the giant cactus (Cereus giganteus)	1	Santa Rosa	14.20	30.91	54	603	2.76	0.149
	2	Sells	17.26	30.77	52	610	3.69	0.071
	3	Sells	17.51	30.20	54	615	3.45	0.079
	Av.		16.32	30.63	54	609	3.30	0.100
Greene's analysis			15.75	21.44			2.34	
Mesquite beans, from the mesquite tree (Prosobis juliflora) [sic.]	1	Catalina Mts.	17.30	2.11	71	415	3.04	0.360
	2	Sells	15.85	3.82	69	416	6.63	0.575
	3	Sells	11.48	3.07	79	427	6.01	0.776
	4	Sells						0.316
	Av.		14.88	3.00	73	419	5.23	0.507
Fruit of the prickly pear cactus (Opuntia)	1	Catalina Mts.	1.73	1.87	50	226	17.48	6.637
	2	Tucson Mts.	1.02	1.99	67	289	20.21	5.830
	3	Catalina Mts.	2.46	3.79	69	325	17.13	7.120
	Av.		1.74	2.55	62	280	18.27	6.439
Fruit of the yucca (Yucca arizonica)	1	Sells	0.67	0.83	94	406	1.88	0.198
	2	Sells	1.49	0.88	93	410	4.23	0.203
	3	Sells	1.45	0.95	92	394	2.06	0.282
	Av.		1.21	0.89	93	403	2.72	0.241

Taken from Ross (1944:41). "Greene's analysis" refers to that made by Robert A. Greene (1936:309-12).

*Calories expressed per 100 grams

FOOD COMPOSITION TABLE 2

AMINO ACID CONTENT OF FOODS, 100 GM., EDIBLE PORTION

Protein Content, and Nitrogen Conversion Factor	Trypto-phan (GM.)	Threo-nine (GM.)	Iso-leucine (GM.)	Leucine (GM.)	Lysine (GM.)	Methio-nine (GM.)	Cystine (GM.)	Phenyl-alanine (GM.)	Tyro-sine (GM.)	Valine (GM.)	Argi-nine (GM.)	Histi-dine (GM.)
Walnuts (English or Persian)(15.0% protein, N 5.30)	0.175	0.589	0.767	1.228	0.441	0.306	0.320	0.767	0.583	0.974	2.287	0.405
Acorns (10.4% protein) N x 5.30)	0.126	0.434	0.561	0.808	0.636	0.139	0.184	0.473	.....	0.718	0.722	0.251
Amaranth seed (14.6% protein)(N x 5.30)	0.149	0.832	0.882	1.209	1.074	0.372	0.521	1.141	.....	0.849	1.747	0.441
Sunflower:												
Kernel (23.0% protein) (N x 5.30)	0.343	0.911	1.276	1.736	0.868	0.443	0.464	1.220	0.647	1.354	2.370	0.586
Meal (39.5% protein) (N x 5.30)	0.589	1.565	2.191	2.981	1.491	0.760	0.797	2.094	1.110	2.325	4.069	1.006
Prickly pears (1.1% protein)(N x 6.25)	0.009	0.053	0.044	0.057	0.044	0.008	.....	0.059	.....	0.041	0.032	0.016
Amaranth greens (3.5% protein) (N x 6.25)	0.038	0.056	0.164	0.206	0.141	0.025	0.024	0.096	0.105	0.136	0.134	0.069

Reproduced from Turner (1959:159-176), who reprinted in abbreviated form the table compiled by Orr and Watt (1957:1-82).

FOOD COMPOSITION TABLE 3

COMPOSITION OF FOODS, 100 GRAMS, EDIBLE PORTION

(Numbers in parentheses denote values imputed--usually from another form of the food or from a similar food. Zero in parentheses indicates that the amount of a constituent is none or is too small to measure. Dashes denote lack of reliable data for a constituent believed to be present in measurable amount. Calculated values, as those based on a recipe, are not in parentheses.)

Item No.	Food and description	Water	Food energy	Protein	Fat	Carbohydrate		Ash	Calcium	Phos-phorus	Iron	Sodium	Potas-sium
						Total	Fiber						
		%	cal.	grams	grams	grams	grams	grams	milligr.	milligr.	milli-gr.	milli-gr.	milli-gr.
11	Amaranth, raw	86.9	36	3.5	.5	6.5	1.3	2.6	2.67	67	3.9	---	411
1240	Lambsquarter, cooked, boiled, drained	88.9	32	3.2	.7	5.0	1.8	2.2	2.58	45	.7	---	---
1625	Pinon	3.1	635	13.0	60.5	20.5	1.1	2.9	12	604	52		
1815	Pricklypear, raw	88.0	42	.5	.1	10.9	1.6	.5	20	28	.3	2	1.66
2236	Sunflower seed kernels, dry	4.8	560	24.0	47.3	19.9	3.8	4.0	120	837	7.1	30	920
2237	Sunflower seed flour, partially defatted	7.3	339	45.2	3.4	37.7	4.6	6.4	348	898	13.2	56	1,030
2420	Walnuts, black	3.1	628	20.5	59.3	14.8	1.7	2.3	trace	570	6.0	3	460

FOOD COMPOSITION TABLE 3 (continued)

Item No.	Food and description	Vitamin A value International units	Thiamine milligr.	Riboflavin milligr.	Niacin milligr.	Asorbic acid milligr.
11	Amaranth, raw	6.100	.08	.16	1.4	80
1240	Lambsquarters, cooked, boiled, drained	9.700	.10	.26	.9	37
1625	Pinon	30	1.28	.23	4.5	trace
1815	Pricklypear, raw	60	.01	.03	.4	22
2236	Sunflower seed kernels, dry	50	1.96	.23	5.4	---
2237	Synflower seed flour, partially defatted	---	3.6	.46	27.3	---
2420	Walnuts, black	300	.22	.11	.7	---

Reproduced from Watt and Merrill (1963:6-66). The scientific names of the above plants are, in order: Amaranthus spp.; Chenopodium album; Pinus cembroides var. edulis; Opuntia spp.; Helianthus annus; and Juglans nigra.

FOOD COMPOSITION TABLE 4

Plant	Moisture	Reducing sugar	Nonreducing sugar	Starch	Hemicellulose	Ether Extract	Protein	Crude Fiber	Ash	Species and Origin
4	16.1	3.3	0.0	0.0	11.0					Juniperus californica Carr. -- California
	----	3.9	0.0	0.0	13.1					Juniper. Berries from California.
4a	21.2	0.5	0.8	0.0	11.0					Ditto
	----	0.6	1.0	0.0	14.0					
5	25.3	19.6	0.0	0.0	9.1					Juniperus occidentalis Hook. -- Western
	----	26.2	0.0	0.0	12.2					Juniper. Berries from California.
6	23.1	6.5	0.0	0.0	9.3					Juniperus utahensis (Engelm.) Lemmon --
	----	8.5	0.0	0.0	12.1					Utah Juniper. Berries from Utah.
6a	10.8	6.9	0.5	0.0	12.0					Ditto
	----	7.7	0.6	0.0	13.5					
8	25.1	2.4	3.7	7.2	4.2	35.2	----	----	----	Pinus edulis Engelm. -- Nut Pine.
	----	3.2	4.9	9.6	5.6	47.1	----	----	----	Nuts from Utah.
8a	3.0	0.0	7.6	5.2	4.2	58.1				Ditto. Colorado.
	----	0.0	7.8	5.3	4.3	59.9				
14	69.8	1.7	18.1	0.0	3.2	----	----	----	----	Allium nuttalli S. Wats.
	----	5.6	59.9	0.0	10.6	----	5.4	----	2.1	Bulbs from Nebraska.
14a	58.9	0.7	20.7	0.0	4.2	----	----	----	----	Ditto
	----	1.7	50.4	0.0	10.2	----	9.8	----	3.2	
22	31.6	4.3	0.0	0.0	11.4	----	----	----	----	Yucca baccata Torr. -- Banana Yucca.
	----	6.3	0.0	0.0	16.7	7.6	7.0	49.7	4.6	Fruit from New Mexico.
22a	8.4	5.6	3.4	0.0	11.9	----	----	----	----	Ditto
	----	6.1	3.7	0.0	13.1	----	10.2	----	4.6	
23	15.3	27.1	0.0	0.0	4.8	----	----		----	Celtis occidentalis L. -- Hackberry.*
	----	32.2	0.0	0.0	5.7	----	11.6		25.9	Berries from Nebraska.
23a	17.4	29.6	0.0	0.0	4.6	----	----		----	Ditto. Kansas.
	----	35.8	0.0	0.0	5.6	2.8	10.0		31.7	
23b	19.0	26.9	0.0	0.0	1.6					Ditto. Nebraska
	----	33.2	0.0	0.0	2.0					
23c	5.1	0.5	0.2	0.0	2.2					Ditto. Green berries from Nebraska.
	----	0.5	0.2	0.0	2.3	----	----		36.7	
30	75.9	6.5	0.0	0.0	3.3					Berberis aquifolium Pursh. -- Oregon
	----	27.0	0.0	0.0	13.7					Hollygrape. Berries from Montana.
35	5.5	2.1	20.5		13.8					Prosopis glandulosa Torr. -- Mesquite.
	----	2.2	21.7		14.7					Pods and beans from New Mexico

APPENDIX II.: INDEX OF PLANT NAMES

The following index of plant names has been added to this paper for the reader's convenience. In the listing of scientific names only the genus has been used here. Common names are those used in the text of this paper, as are the use categories. The use category "food" is a particularly broad one and includes such varied sub-categories as potherbs and tulipai additives.

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REFERENCES CITED

Appelgren, Walter P.
1971 Personal communication.

Arizona. State Museum, Tucson
1951 The ethnobotany of the Kayenta Navajo: an analysis of the John and Louisa Wetherill ethnobotanical collection by L. C. Wyman and S. K. Harris. University of New Mexico Publications in Biology, 5.

Baldwin, G. C.
1965 The warrior Apaches: a story of the Chiricahua and Western Apache. Tucson: D. S. King.

Barrows, David Prescott
1967 The ethno-botany of the Coahuilla Indians of southern California. Banning, California: Malki Museum Press. [Reprinted from the original 1900 edition published by the University of Chicago Press.]

Basso, Keith H.
1969 Western Apache witchcraft. University of Arizona Anthropological Papers, 15.

Bollada, Juan Embil
1947-48 The pharmacology of Larrea divaricata. Anales de la Academia de Ciencias Medicas, Fisicas y Naturales de la Habana 86:147-50.

Bourke, John G.
1971 On the Border with Crook. Lincoln: University of Nebraska Press. [Reprinted from the original 1891 edition published by Charles Scribner's Sons.]

1892 The medicine men of the Apache. Bureau of American Ethnology Annual Report 9:451-603.

Bryan, Nonabah G. and Stella Young
1940 Navajo native dyes: their preparation and use. Washington, D. C.: United States Department of the Interior.

Buchalter, Leonard
1966 A phytochemical investigation of the roots and tubers of Rumex hymenosepalus, family Polygonaceae. University of Arizona: unpublished Ph.D. dissertation.

Buskirk, Winifred
1949 Western Apache subsistence economy. University of New Mexico: unpublished Ph.D. dissertation.

Castetter, Edward F.
1935 Uncultivated native plants used as sources of food. University of New Mexico Bulletin, Biological Series 4(1).

Castetter, Edward F. and Willis Bell
1937a The aboriginal utilization of the tall cacti in the American Southwest. University of New Mexico Bulletin, Biological Series 5(1).

1937b The utilization of mesquite and screwbean by the aborigines in the American Southwest. University of New Mexico Bulletin, Biological Series 5(2).

1938 The utilization of yucca, sotol and beargrass by the aborigines in the American Southwest. University of New Mexico Bulletin, Biological Series 5(5).

Castetter, Edward F., Willis Bell and A. K. Grove
1938 The early utilization and distribution of agave in the American Southwest. University of New Mexico Bulletin, Biological Series 4(4).

Castetter, Edward F. and Morris Opler
1936 The ethnobiology of the Chiricahua and Mescalero Apache. University of New Mexico Bulletin, Biological Series 4(5).

Castetter, Edward F. and Ruth M. Underhill
1935 The ethnobiology of the Papago Indians. University of New Mexico Bulletin, Biological Series 4(3).

Celayeta, Filomena Diaz
1960 Action of the tissues of various plants on the growth of Sphacelia segetum. Farmacognosia 20:91-101.

Chamberlin, R. V.
1909 Some plant names of the Ute Indians. American Anthropologist 11:27-40.

1911 The ethno-botany of the Goisute Indians of Utah. American Anthropological Association Memoirs 2(5):329-405.

Cook, Sarah Louise
1930 The ethnobotany of the Jemez Indians. University of New Mexico: unpublished master's thesis.

Corbusier, William T.
1968 Verde to San Carlos: recollections of a famous army surgeon and his observant family on the Western frontier 1869-1886. Tucson: D. S. King.

Cruse, Robert R.
1949 A chemurgic survey of the desert flora in the American Southwest. Economic Botany 3:111-31.

DeLaszlo, Henry and Paul S. Henshaw
1954 Plant materials used by primitive peoples to affect fertility. Science 119:626-31.

Elmore, Francis H.
1944 Ethnobotany of the Navajo. School of American Research Monographs 8.

Forde, C. D.
1931 Ethnography of the Yuma Indians. University of California Publications in American Archaeology and Ethnology 28: 83-278.

Frazer, R.
1885 The Apaches of the White Mountain Reservation. Philadelphia: Indian Rights Association.

Galanti, Maurice and Paul Manil
1954 Antibiotic action of extracts of higher plants: some experimental observations on the genus Geranium. Comptes Rendus des Seances de la Societe de Biologie et de ses Filiales 148:1892-94.

Gifford, Edward W.
1932 The Southeastern Yavapai. University of California Publications in American Archaeology and Ethnology 29:177-252.

1933 The Cocopa. University of California Publications in American Archaeology and Ethnology 31:257-334.

1936 Northeastern and Western Yavapai. University of California Publications in American Archaeology and Ethnology 34: 247-354.

1940 Culture element distributions: XII : Apache-Pueblo. University of California Anthropological Records 4(1).

Gilbertson, R. L. and A. B. Buddington
1970 New records of Arizona wood rotting fungus. Journal of the Arizona Academy of Sciences 6(2):91-97.

Goddard, Pliny Earle
1918 Myths and tales from the San Carlos Apache. Anthroooological Papers of the American Museum of Natural History 24, pt. 1.

Goodwin, Grenville
n.d. Notes on Apache ethnobotany. Unpublished manuscript.

1935 The social divisions and economic life of the Western Apache. American Anthropologist 37:55-64.

1936 Experiences of an Indian scout: excerpts from the life of John Rope, an 'old timer' of the White Mountain Apaches. Arizona Historical Review 7(1):31-68; 7(2): 31-73.

1942 The social organization of the Western Apache. Chicago: University of Chicago Press.

Greene, Robert A.
1936 The composition and uses of the giant cactus, Carnegiea gigantea and its products. Journal of Chemical Education 13:309-12.

Harrington, H. D.
1967 Edible native plants of the Rocky Mountains. Albuquerque: University of New Mexico Press.

Hedrick, U. P., ed.
1919 Sturtevant's notes on edible plants. Albany: J. B. Lyon Company, State Printers.

Hicks, Frederick Noble
1963 Ecological aspects of aboriginal culture in the Western Yuman area. University of California, Los Angeles: unpublished Ph.D. dissertation.

Hill, Albert F.
1952 Economic botany: A textbook of useful plants and plant products, New York: McGraw-Hill.

Hrdlička, Aleš
1904 Method of preparing tesvino among the White River Apache. American Anthropologist 6:190-91.

1908 Physiological and medical observations among the Indians of Southwestern United States and Northern Mexico. Bureau of American Ethnology Bulletin 34:1-460.

Jones, Volney Hurt
1931 The ethnobotany of the Isleta Indians. University of New Mexico: unpublished master's thesis.

Kaludin, Krum
1967 Vitamin E content in the leaves of some conifers. Gorskostopanska Nauka 4 (4):87-95.

Kearney, Thomas H. and Robert H. Peebles
1960 Arizona Flora. Berkeley: University of California Press.

Kroeber, A. L., ed.
1935 Walapai ethnography. American Anthropological Association Memoirs 42.

Leonova, E. F.
1957 Pharmacology of Xanthium strumarium. Fiziologichnii Zhurnal Akademia Nauk Ukrains'koi R.S.R. 3:137-41.

Meigs, Peveril
1939 The Kiliwa Indians of lower California. Ibero-Americana 15.

Miller, Peter S.
1970 Secular changes among the Western Apache. American Journal of Physical Anthropology 33:197-206.

Mitchell, Dennis
1971 Personal communication.

Mohaček, Marco
1959 Acorns of English oak, durmast oak and Turkey oak. Arhiv Poljoprivedne Nauke 12(36):106-25. German summary 126-27.

Morris, Clyde Patrick
1971 A brief economic history of the Camp and Middle Verde Reservations. Plateau 44:43-51.

Ogle, Ralph H.
1970 Federal control of the Western Apaches 1848-1886. Albuquerque: University of New Mexico Press.

Orr, M. L. and B. K. Watt
1957 Amino acid content of foods. United States Department of Agriculture Home Economics Research Report 4.

Paessler, J.
1917 Tannin content of green walnut shells. Journal of the Indian Chemical Society 36:605.

Palmer, Edward
1878 Plants used by the Indians of the United States. American Naturalist 12:593-606; 646-55.

1890 Customs of the Coyotero Apaches. Zoe 1(6):161-72.

Pant, Radha and Pushp Lata Bishnoi
1967 Chemical composition of some wild Indian leguminous seeds. Current Science 36(14):365-67.

Pshenichnova, N. R. and G. Gubina
1967 Antibacterial activity of new binders. Trudy Permskii Farmatsevticheskii Institut No. 2:63-73.

Read, B. E. and C. T. Feng
1927 The alleged ephedrine action of two California species of Ephedra. Proceedings of the Society for Experimental Biology and Medicine 24:819-21.

Reagan, A. B.
1929 Plants used by the White Mountain Apache Indians of Arizona. Wisconsin Archaeologist 8:143-61.

Robbins, Wilfred W., J. P. Harrington and Barbara Freire-Marreco
1916 Ethnobotany of the Tewa Indians. Bureau of American Ethnology Bulletin 55.

Roberts, Helen H.
1929 Basketry of the San Carlos Apache. American Museum of Natural History Anthropological Papers 31:121-218.

Rogers, J. S. and G. A. Russell
1944 Canaigre investigations. I. A review and preliminary report. Journal of the American Leather Chemists' Association 39:467-79.

Ross, Winifred
1944 The present day dietary habits of the Papago Indians. University of Arizona: unpublished master's thesis.

Russell, Frank
1908 The Pima Indians. Bureau of American Ethnology Annual Report 26:3-390.

Salle, A. J., Gregory J. Jann and Lawrence G. Wayne
1951 The antibacterial properties of Eriodictyon californicum. Archives of Biochemistry and Biophysics 32:121-23.

Schoolcraft, Henry Rowe
1855 Apaches. In Historical and statistical information respecting the history, condition and prospects of the Indian tribes of the United States, Vol. 5. H. R. Schoolcraft, ed. Philadelphia: Lippincott, Grambo.

Smart, C.
1867 Notes on the 'Tonto' Apaches. Annual Reports of the Board Of Regents of the Smithsonian Institution 22:417-19.

Stecher, Paul G. et al., eds.
1968 The Merck index: an encyclopedia of chemicals and drugs. Rahway, N.J.: Merck and Company, Inc.

Stevenson, Matilda Coxe
1915 Ethnobotany of the Zuni Indians. Bureau of American Ethnology Annual Report 30:31-102

Steward, J. H.
1933 Ethnography of the Owens Valley Paiute. University of California Publications in American Archaeology and Ethnology 30:233-350.

Turner, Dorothea
1959 Handbook of diet therapy. Chicago: University of Chicago Press.

Vestal, Paul Anthony
1952 Ethnobotany of the Ramah Navajo. Papers of the Peabody Museum of Archaeology and Ethnology 40(4).

Vogel, Virgil
1970 American Indian medicine. Norman: University of Oklahoma Press.

Vosburg, Mary D.
1971 Personal communication.

Yanovsky, Elias and R. M. Kingsbury
1938 Analyses of some Indian food plants. Journal of the Association of Official Agricultural Chemists 21:648-655.

Watt, Bernice K. and Annabel L. Merrill
1963 Composition of foods. Agriculture Handbook No. 8. Washington, D. C.: United States Department of Agriculture.

Whiting, Alfred F.
1939 Ethnobotany of the Hopi. Museum of Northern Arizona Bulletin 15.

1940-41 Havasupai habitat. Unpublished manuscript.

Woodward, A.
1943 John G. Bourke on the Arizona Apache, 1874. Plateau 16: 33-44.

Wycliffe Bible Translators
1958 John, James, I. John. Mimeographed copy from Seneca Creek, Globe, Arizona.

Wyman, Leland C. and Stuart K. Harris
1941 Navajo Indian medical ethnobotany. University of New Mexico Bulletin 366.

Youngken, H. W.
1950 Textbook of pharmacognosy. Philadelphia: The Blakiston Company.

Zigmond, Maurice Louis
1941 Ethnobotanical studies among California and Great Basin Shoshoneans. Yale University: unpublished Ph.D. dissertation.